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VOCATIONAL INDUSTRIAL EDUCATION IN NEWLY DEVELOPING NATIONS,
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FINDINGS AND CONCLUSIONS OF A DOCTORAL STUDY, "THE JOINT PHILIPPINE-AMERICAN PROJECT FOR EXPANDING AND IMPROVING VOCATIONAL INDUSTRIAL EDUCATION IN THE PHILIPPINES, 1951-1956," ARE PRESENTED AS PROJECT ACCOMPLISHMENTS, PROJECT STRENGTHS AND WEAKNESSES, AND ADMINISTRATIVE AND TECHNICAL GUIDELINES FOR FUTURE PROJECTS. SOME OF THE ACCOMPLISHMENTS WERE--(1) THE NUMBER OF PUBLIC VOCATIONAL INDUSTRIAL SCHOOLS INCREASED FROM 29 TO 35, AND THE NUMBER OF THESE SCHOOLS OFFERING POST-SECONDARY LEVEL INSTRUCTION INCREASED FROM 3 TO 21, (2) PROFESSIONAL PERSONNEL ON THE CENTRAL ADMINISTRATIVE STAFF INCREASED FROM 7 TO 26, (3) THE TOTAL ENROLLMENT INCREASED FROM 21,208 IN 1951 TO 30,000 IN 1956, A FIGURE CONSIDERED CONSISTENT WITH AVAILABLE FACILITIES, (4) THE REGULAR FUNDS PROVIDED THROUGH NORMAL CHANNELS FOR THE ANNUAL OPERATION MORE THAN DOUBLED FROM 1951 TO 1955, (5) ALL SCHOOLS WERE PROVIDED WITH NEW TECHNICAL BOOKS, AND (6) NEW BUILDINGS WERE CONSTRUCTED AT ALL OF THE SCHOOLS. THIRTY-SEVEN ADMINISTRATIVE GUIDELINES SUGGEST PROCEDURES FOR DEVELOPING, EXECUTING, AND CONTROLLING A COMPREHENSIVE LONG-RANGE MASTER PLAN. THE SUGGESTED TECHNICAL GUIDELINES COVER A NATIONAL PLAN FOR HUMAN RESOURCES DEVELOPMENT, THE PROVINCIAL OR STATE SCHOOL, THE URBAN SCHOOL OR COLLEGE, THE CENTRAL ADMINISTRATIVE STAFF, TEACHER EDUCATION, AND PREPARATION OF ADMINISTRATORS AND SUPERVISORS. (MM)

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VOCATIONAL INDUSTRIAL EDUCATION IN NEWLY DEVELOPING NATIONS

A Case Study of the Philippines 1951-1956

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FOREWORD

We live in a time of great expectations. The peoples of the newly developing nations have caught a vision of life potentially free from hunger, disease, ignorance, and serfdom. These peoples, constituting the formerly depressed two-thirds of the human family, are on the march in Africa, in Asia, and in the Americas. They are determined to create economic, social, and political institutions and laws through which they can assure themselves health, longevity, the material necessities, and even some luxuries; political stability with justice and freedom; and social conditions conducive to equality of opportunity.

In this heroic effort to create a better life the leaders of the newly developing nations look to education—particularly vocational education—to revolutionize the life of their people. To produce more food and fiber, farmers must be taught modern agricultural methods. To process consumer goods efficiently from the raw materials of field, forest, mine, and sea, labor and management must know modern industrial techniques. Vocational education has become a major weapon in the struggle of economic growth.

During the 1950's, at the request of the newly developing nations, world-wide technical assistance in vocational education was provided by the UN agencies FAO, ILO, WHO, UNESCO, and the Technical Assistance Board. On a bilateral nation-to-nation basis, the United States, the USSR, and other technically advanced peoples have been sending their vocational educators to help those who requested aid. The largest assistance program carried on during the decade was that provided by the United States of America. The United States International Cooperation Administration has spent large sums in helping establish or strengthen national systems of vocational education in more than fifty nations or territories.

The demand for help in designing and building national programs of vocational education has been so pressing that little time or effort has remained for critical study of the effectiveness of the undertaking. We have not analyzed our effort and extracted therefrom a set of principles that would guide us in improving subsequent aid programs. While comprehensive and fundamental evaluation of aid programs must wait a decade or more to allow the full impact on the developing nations to run its course, nevertheless evaluations of procedures used and of short-term impact is possible and necessary.

To date, this study by Sidney C. High, Jr. is one of the few systematic attempts at evaluation of procedures utilized. Mr. High was closely identified with this joint Philippines-United States effort to improve vocational industrial education during the period discussed, 1951 to 1956.

The complete study, submitted to Stanford University in partial fulfillment of the requirements for the doctorate, is available from University Microfilms, Inc., 313 North First Street, Ann Arbor, Michigan. It may be ordered under the title: The Joint Philippine-American Project for Expanding and Improving Vocational Industrial Education in the Philippines, 1951-1956. See the Appendix, page 65, for the Table of Contents of the complete study.

The excerpt here published presents findings and conclusions of Mr. High's research. It is our hope that cooperating United States and UN agencies and national leaders, intent upon using education as an instrument of national policy, will profit from his report on the Philippines, that they may find significant guidelines for similar projects, and principles against which they may evaluate their efforts.

Paul R. Hanna
Professor of Education
Stanford University

March 1, 1960

PREFACE

For more than a decade, as part of the overall United States assistance to newly developing areas of the world, the U.S. Government has been engaged in projects designed to help developing nations expand and strengthen their systems of industrial education. Vocational industrial education has been widely recognized as an essential component of national plans for industrialization and economic development. As efforts are intensified to help in the economic growth of the newly developing countries, assistance projects in industrial education will continue to form an important part of these efforts. In order to make future assistance in industrial education more effective, there is a need for reviewing, analyzing, and evaluating some of the experience which has been gained to date.

The specific project chosen for analysis in the present study is the joint Philippines-American effort at expanding and improving vocational industrial education in the Philippines. This project was initiated in 1951 under the auspices of the United States Economic Cooperation Administration (ECA) and the Philippines Council for United States Aid (PHILCUSA). The project is still being carried on and is now (1960) under the sponsorship of the United States International Cooperation Administration (the successor to ECA) and the Philippines National Economic Council (the successor to PHILCUSA).

The original study, from which this published excerpt has been taken, was limited to the first five years of the project, beginning July 1, 1951 and ending June 30, 1956. The research thus covers the five fiscal years known in government terminology as FY '52, FY '53, FY '54, FY '55, and FY '56.

In the original study, submitted as a doctoral dissertation to Stanford University, there are five parts. In this publication, only Part IV, "Evaluation", is published. For those who wish to see how Part IV is related to the entire dissertation, the full Table of Contents of the original study is reproduced in the Appendix.

Part I of the original dissertation provides background information. Because the vocational industrial education project operated within the Philippines setting and at the same time within the broader framework of United States assistance to the newly developing areas of the world, a chapter each is devoted to the development of United States foreign assistance since World War II and to the general Philippines environment. These two chapters serve to portray the surrounding conditions and events which influenced the planning and implementation of the project.

In Part II, the project itself is treated in narrative fashion. The opening chapter of Part II sketches the historical roots of the project, including the general development of formal education in the Philippines and the specific development of the vocational industrial education system. The following chapter, Chapter V, describes the status of vocational industrial education in the Philippines in 1951, just before the initiation of the assistance project. In Chapter VI, the development of the five-year plan for the project is described and the content of the plan is summarized. Chapter VII relates the launching of the project and deals with the "paper stage," FY '52 and FY '53, during which detailed surveys of needs were made, orders were placed for imported equipment, funds were budgeted and blueprints drawn for new buildings, and the initial groups of Filipino personnel (participants) were sent abroad for advanced training.

Chapter VIII of the full dissertation describes the "operational" stage of the project, FY '54 and FY '55, during which new buildings were erected, imported equipment arrived and was installed, and in-service training programs were conducted to familiarize the vocational industrial teachers with the care and operation of the new machinery. Chapter IX deals with the "shakedown stage," FY '56, during which efforts were made to improve the overall functioning of the expanded and rejuvenated vocational industrial education system and a beginning was made on long-range improvements in the pre-service education of vocational industrial teachers.

Following the narrative account of the project in Part II, Part III of the original dissertation consists of a detailed analysis of the several strands of the project, such as the importation of equipment, the construction of buildings, and the provision of technical assistance, as well as an analysis of the impact of the project on various aspects of the Philippines vocational industrial education program.

The information on which Parts II and III are based was drawn from sources such as the following:

(a) Official United States and Philippines documents relating to the project, such as project descriptions, firm requests, counterpart project agreements, and budgets;

(b) Technical records of the project, such as blueprints of buildings constructed and specifications of equipment purchased;

(c) Memoranda, monthly reports, and field trip reports written by members of the United States Operations Mission to the Philippines, as well as correspondence between the Mission and the Philippines Government;

(d) Bulletins, circulars, memoranda, statistical data, and reports prepared by the Philippines Bureau of Public Schools;

(e) The writer's personal experience with the project as an industrial education specialist on the staff of the United States Operations Mission to the Philippines.

In Part IV of the original dissertation, published hereafter in full, the accomplishments of the project are reviewed, some of the major strengths and weaknesses in the planning and the execution of the project are discussed, and a series of guidelines are formulated for similar projects that might be undertaken in the future.

Part V of the original dissertation, consisting of a final chapter which summarizes the dissertation, closes with the following suggestions for further study:

1. Similar studies are needed of vocational industrial education projects in other newly developing nations.

2. A further study should be made of the Philippines vocational industrial education project, covering the five-year period from July 1, 1956 to June 30, 1961. Such a study, when added to the present investigation, would provide a record in depth of a decade of assistance in vocational industrial education in the Philippines.

3. Studies should be made of assistance projects in other phases of vocational education, such as agricultural education, home economics education, industrial arts education and commercial education.

4. After such studies have been completed, a master study should be made of all the individual project studies. The master study would attempt to combine and compare the experience of the separate projects and seek overall relationships and guidelines.

5. In future analyses, care should be taken to study in depth the relation of the educational enterprise to the broad cultural patterns of each nation and to note general principles of cultural continuity and cultural change within which education as an instrument of national policy operates.

March 1, 1960
Saigon, Vietnam

Sidney C. High, Jr.

ABBREVIATIONS USED IN THIS STUDY

ECA	U.S. Economic Cooperation Administration
FAO	U.N. Food and Agriculture Organization
ICA	U.S. International Cooperation Administration
ILO	International Labour Organisation
PHILCUSA	Philippines Council for United States Aid
NEC	Philippines National Economic Council
PAVE	Philippine Association for Vocational Education
SAT	School of Arts and Trades
TS	Trade School
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
VHS	Vocational High School
$	U.S. Dollar
₱	Philippine Peso (At the official rate of exchange, two Philippine pesos equal one U.S. dollar.)
FY	Fiscal Year (The period beginning on July 1 of one year and ending on June 30 of the following year. For example, FY '56 is the period beginning on July 1, 1955 and ending on June 30, 1956.)
TA	Technical Assistant (An American specialist furnished through Type B technical assistance arrangements to assist a developing nation in planning and carrying out a project.)

Technical Assistance

Type A	The sending abroad of selected personnel from a developing nation for study and observation in other countries. Such personnel are usually referred to as "trainees" or "participants."
Type B	The furnishing of American specialists, employed and administered directly by the U.S. Government, to work on assistance projects in developing nations.
Type C	Technical assistance furnished through the medium of a university contract.

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PROJECT ACCOMPLISHMENTS

By June 30, 1956, at the end of the first five years of operation of the joint Philippines-American project for expanding and improving vocational industrial education, an impressive list of accomplishments could be cited. The total number of public vocational industrial schools in the Philippines had been increased from 29 to 35. The number of these schools offering work beyond the secondary level had been increased from 3 to 21.

The Philippines Department of Education central administrative staff for trade and industrial education had been expanded from a small section to a full-fledged division in the headquarters of the Bureau of Public Schools. The number of professional personnel on the central administrative staff had been increased from 7 to 26. As part of the increase, a group of specialized supervisors had been developed to assist the schools in the care and operation of specific types of equipment and in the improvement of shop courses.

The ability of the central staff to perform its functions had been enhanced considerably. Enough staff members and adequate travel funds were available so that frequent visits could be made to the schools in the field. Sufficient staff time and facilities were available so that data could be collected and organized and comprehensive and up-to-date information about the schools could be maintained. The tempo of decision making and processing of administrative paper work had been quickened. The technical competence of the staff for making sound decisions had been improved.

The number of positions for superintendents in the vocational industrial education program had been increased from 5 to 25. This increase had been accomplished by the creation of 2 new positions for superintendents on the central administrative staff and by the establishment of 18 new positions for superintendents as heads of individual schools.

The total enrollment in the vocational industrial schools had been increased by 9,561 students, rising from 21,208 in Fiscal Year 1951 (written FY '51) to 30,769 in FY '56. In FY '55 and FY '56 the enrollment had been leveled off deliberately at about 30,000, a figure considered consistent with available facilities.

The number of male students in the vocational industrial schools had been increased by 5,724, rising from 18,022 in FY '51 to 23,746 in FY '56. The ratio of male vocational industrial students to the total population of the Philippines had risen from 1 to 1,124 in FY '51 to 1 to 926 in FY '56.

Of the total enrollment in the vocational industrial schools, the proportion of students enrolled in the secondary trade curriculum had declined from about 92% in FY '53 to 86% in FY '56. At the same time the proportion of students enrolled at the college level in the technical curriculum and the industrial teacher education curriculum had grown from about 8% to 14%. In other words, the vocational industrial schools were placing increasing emphasis on the training of older age groups at the post-secondary level.

The pattern of enrollment in the various types of courses had been modified. The mechanics courses continued to attract the largest percentage of students. However, the percentages enrolled in furniture making and building construction had been reduced and the percentages enrolled in electrical and metalworking courses had been increased.

The regular funds provided through normal channels for the annual operation of the vocational industrial schools had been more than doubled. A study based on data from all but two of the vocational industrial schools indicated that the funds available for regular operational expenses rose from ₱2,223,000 in FY '51 to ₱5,273,000 in FY '55. The portion of the regular funds provided by the Philippines national government had been increased ninefold, rising from ₱329,000 in FY'51 to ₱2,997,000 in FY '55.

The regular funds available for operational expenses had increased more rapidly than the number of students, resulting in a rise in the per student expenditure. A study based on data from all but four of the vocational industrial schools indicated that the expenditure per student rose from ₱110 in FY '51 to ₱175 in FY '55.

With International Cooperation Administration dollar funds, approximately $1,500,000 worth of commodities had been imported for the vocational industrial schools. These commodities included diesel-electric generators, woodworking machines, metalworking machines, equipment for electricity shops, equipment for mechanics shops, ceramics equipment, printing equipment, foundry equipment, hand tools, technical books, films, filmstrips, and projectors. The importation of ICA-financed commodities had resulted in great gains in the amount of equipment on hand at the schools.

At the vocational industrial schools outside of Manila, where much of the electrical current for the operation of shop machinery had to be produced by the schools themselves, the total diesel-electric generating capacity in school-owned generators had been increased from 346 kilowatts to 1,643 kilowatts. Important increases had been made in the amount of woodworking machinery on hand at all schools. Even larger increases had been made at all schools in the amount of equipment on hand for metalworking, electrical, and mechanics courses. Equipment for ceramics courses and printing courses, formerly almost nonexistent in the Philippines, had been supplied to a number of selected schools. By the end of FY '56, the project had equipped 12 schools with ceramics shops and 8 schools with print shops. Foundry equipment, previously not available in any of the vocational industrial schools, had been supplied to 5 schools.

All of the schools had been provided with new technical books, and at many schools these new ICA-imported books represented an increase of 200% or more in the supply of technical volumes on hand. Motion picture projectors, filmstrip projectors, and opaque projectors had been furnished to all schools. A central library of industrial training films and filmstrips had been established in the Trade and Industrial Education Division of the Bureau of Public Schools, and arrangements had been made for circulating these films and filmstrips among the schools. In general, as a result of the importation of ICA-financed commodities the Philippines vocational industrial schools had been transformed from ill-equipped to moderately well-equipped institutions.

New buildings had been constructed at all of the vocational industrial schools. The total amount of floor space in permanent and semipermanent shop buildings had been increased from 378,000 square feet to 719,000 square feet. The total amount of floor space in permanent and semipermanent classroom buildings had been increased from 249,000 square feet to 417,000 square feet. Eighty-eight per cent of the new construction had been financed with peso allocations from the ICA-NEC counterpart fund and from the National Economic Council's lump-sum appropriation. Twelve per cent of the new construction had been financed with peso funds from the regular budgets of the vocational industrial schools.

Substantial gains had been made, on an overall national average, in the amount of floor space per student in the vocational industrial schools. On the basis of half of the male students being in the shops and half in the classrooms at any one time, the amount of shop floor space per student in permanent and semipermanent buildings had been increased from 36 square feet to 60 square feet. The amount of classroom floor space per student in permanent and semipermanent buildings had been increased from 24 square feet to 34 square feet.

With peso allocations from the ICA-NEC counterpart fund and from NEC's lump-sum appropriation, the vocational industrial schools had purchased lumber and other materials and had constructed for their own use a large amount of shop and classroom wooden furniture. This furniture included workbenches, tool cabinets, drawing tables, classroom desks, bookcases, and teachers' desks.

Extensive technical assistance in industrial education had been financed through a combination of ICA dollar funds and peso allocations from the ICA-NEC counterpart fund. Fifty-five Filipino industrial educators had been sent to the United States as Type A trainees. By June 30, 1956, 53 of these trainees had completed their studies and had returned to the Philippines. From the FY '56 budget, funds had been obligated for sending 10 more trainees to the United States. It was anticipated that the 10 new trainees would leave the Philippines early in FY '57. By the time all 65 of the Type A trainees had completed their studies and had returned to the Philippines, they would have spent a total of 632 man-months abroad.

Five United States industrial education specialists had been brought to the Philippines as Type B technical assistants or "TA's." These TA's had rendered a total of 125 man-months of service.

In the latter part of FY '56, a contract had been signed with Stanford University for 4 years of Type C technical assistance in industrial and industrial arts teacher education. ICA dollar funds had been obligated to meet the dollar costs of the contract services. An ICA-NEC counterpart budget had been set up to meet the peso costs of the contract services. Under the terms of the contract, Stanford University was to provide American faculty members for a total of 252 man-months[1] to work with two industrial teacher education institutions in the Philippines. By June 30, 1956, the first Stanford team of 8 faculty members had arrived in Manila and had begun the contract operations.

In addition to the Type A, Type B, and Type C technical assistance financed with ICA-NEC dollar and peso funds, a small amount of technical assistance had been secured from other sources. Six Filipino industrial educators had been sent abroad as trainees under programs sponsored by the Colombo Plan and the International Labour Organisation.

In order to insure proper maintenance and effective use of the new equipment imported for the vocational industrial schools, large-scale in-service training programs for the vocational industrial teachers had been planned, financed, and conducted. Approximately 56% of the shop teachers from the vocational industrial schools had been assembled in central locations for 4 weeks of intensive in-service training. The in-service training courses had been taught by returned Type A trainees and by United States Type B industrial education specialists.

Besides the in-service training programs for teachers, 6 conferences and seminars had been held for the vocational industrial superintendents, principals, and supervisors. These conferences and seminars had served to improve the administrative and supervisory practices in vocational industrial education.

Opportunities had been provided for groups of industrial educators from Viet-Nam, Cambodia, Thailand, and Burma to visit the Philippines and observe the Philippines vocational industrial schools. Arrangements had been made for the Cambodian group to receive instruction in one of the in-service training programs for Filipino vocational industrial teachers.

In order to insure an adequate supply of well-trained new teachers to meet the expansion and replacement needs of the vocational industrial schools, a series of steps had been taken to strengthen pre-service industrial teacher education in the Philippines:

(a) The industrial teacher education curriculum had been lengthened and elevated from a two-year curriculum at the junior college level to a full four-year curriculum at the college level.

(b) Authority had been secured from the Philippines Congress for the granting of the B.S. degree to students who completed the four-year industrial teacher education curriculum.

(c) Some of the Type A trainees, while in the United States, had studied the curricular patterns used by American colleges and universities for pre-service industrial teacher education.

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1. Stanford University faculty served a total of 699 man-months during the life of the contract as amended.

(d) On the basis of these studies, the Philippines industrial teacher education curriculum had been reorganized and divided into two separate curricula. One of the curricula was designed to prepare vocational industrial teachers for service in schools of arts and trades, in trade schools, and in vocational high schools. The other was designed to prepare industrial arts teachers for service in elementary schools and general high schools.

(e) From regular Philippines sources, the three special Schools of Arts and Trades (hereafter, SAT), which were responsible for industrial and industrial arts teacher education (the Philippine SAT,[2] the Iloilo SAT, and the Cebu SAT) had been provided with enlarged annual budgets for meeting their recurring operational expenses.

(f) With ICA-NEC dollar and peso funds, the three special SAT's had been supplied with new equipment, books, and buildings to supplement their existing facilities.

(g) Selected faculty members from the three special SAT's had been sent to the United States as Type A trainees to improve their qualifications by undertaking advanced studies in industrial and industrial arts education.

(h) Finally, the contract had been signed with Stanford University for Type C technical assistance in industrial and industrial arts teacher education.

This series of steps, taken over a period of 5 years, had paved the way for long-range improvements in pre-service industrial and industrial arts teacher education in the Philippines.

The number of professional personnel serving in the vocational industrial schools had been almost doubled. In FY '51 the total number of administrators, supervisors, shop teachers, and classroom teachers, both male and female, employed by the vocational industrial schools was 880. By FY '56 this figure had been increased to 1,630.

Not only had the professional personnel of the vocational industrial schools increased in number, but they had also improved in terms of educational qualifications. In FY '51, less than 0.5% of the personnel held the master's degree and only 37% held the bachelor's degree. By FY '56, 2.5% held the master's degree and 51% held the bachelor's degree.

From ICA dollar funds, a total of $2,602,250 had been obligated to assist the vocational industrial schools. Sixty per cent of this amount had been obligated for the importation of commodities and 40% had been obligated for Type A, Type B, and Type C technical assistance.

From the ICA-NEC counterpart fund and from NEC's lump-sum appropriation, a total of ₱7,473,719 had been obligated to assist the vocational industrial schools. Seventy-five per cent of this amount had been obligated for capital outlay, principally for the construction of new shop and classroom buildings. Eight per cent had been obligated for technical assistance. Seventeen per cent had been obligated to meet special operational and administrative expenses generated by the assistance project.

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[2] Became the Philippines College of Arts and Trades in 1959.

During the 5 year period ending on June 30, 1956, the Philippines Congress had passed 25 acts affecting industrial education. This was twice as many acts concerning industrial education as had been passed in the preceding 50-year period. Fifteen of the 25 acts represented measures which were in support of the five-year plan for the expansion and improvement of vocational industrial education.

The curricula of the vocational industrial schools had been revised and improved. The four-year secondary trade curriculum, which in FY '51 provided for an average of 31 hours and 40 minutes of instruction per week, had been expanded to provide for an average of 33 hours and 45 minutes of instruction per week. The time allotments and course content of the secondary classroom subjects and shop courses had been reorganized. At the post-secondary level, the technical curriculum had been lengthened from two years to four years and extensive changes had been made in both shop and classroom subjects.

Several specialized types of shop courses, formerly almost nonexistent in the Philippines, had been developed and introduced in a number of schools. These included courses in ceramics, printing, foundry, and diesel engines.

A group of three vocational industrial administrators had been sent to the United States as Type A trainees to study the administration of apprenticeship training programs. Another three-man group had been sent to study the operation of foreman and supervisory training programs. Thus a nucleus of Filipino personnel had been established to help the vocational industrial schools in inaugurating work in apprentice training and foreman and supervisory training.

As a by-product of the growing activity in vocational education, a national professional organization of vocational educators had been formed. This organization, known as the Philippine Association for Vocational Education, or PAVE, had become firmly established and was developing into an important force for the betterment of vocational education in the Philippines.

The above summary statement documents the claim that much had been accomplished during the first 5 years of operation of the joint Philippines-United States project for expanding and improving vocational industrial education. In the pages which follow, these actual accomplishments will be compared with the original objectives of the project.

The objectives of the vocational industrial education project were set forth in the Bell Report and the Yulo Report. The Bell Report stated simply that "the public school system should provide greater facilities for agricultural and vocational education"[3] and that the Philippines Government should "take steps to improve training facilities for technicians in the Philippines."[4] By the end of FY '56 there was ample justification for maintaining that, insofar as vocational industrial education was concerned, substantial progress had been made toward the accomplishment of these objectives. The facilities of all of the existing vocational industrial schools had been expanded, several new vocational industrial schools had been established, technical assistance had been provided to help the faculties of the schools in making effective use of the new and enlarged facilities, and a program of teacher education had been inaugurated.

While the Bell Report stated the objectives of the vocational industrial education project primarily in terms of the expansion and improvement of physical facilities, there could be little doubt that the carrying out of these physical improvements resulted in better instruction in the vocational industrial courses. This point can best be illustrated by the series of photographs shown in Figures 1 through 7.

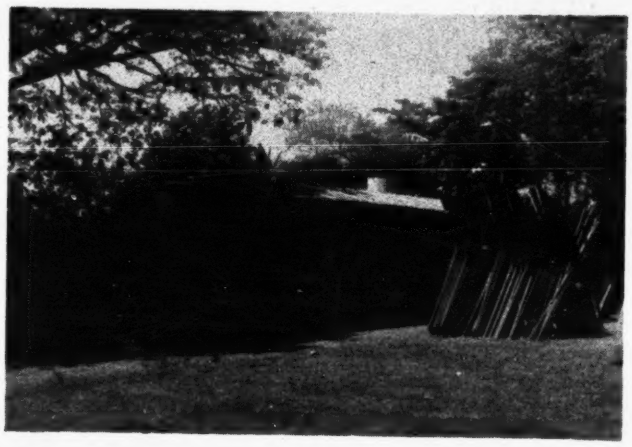

Fig. 1—Before ICA-NEC Assistance. The Automechanics Shop at the Western Luzon SAT.

For example, Figure 1 shows the automechanics shop at the Western Luzon SAT prior to the start of the ICA-NEC assistance project. The shop was housed in a makeshift building with a dirt floor, a light wooden frame, and a galvanized iron roof. The walls were covered with old rusty sheets of galvanized iron and pieces of scrap lumber. Because the walls were incomplete, equipment could not be left in the building overnight. The only equipment on hand consisted of a very small and incomplete assortment of old hand tools.

Figure 2 shows the new automechanics shop constructed at the Western Luzon SAT with ICA-NEC peso funds. The new building had a concrete floor, a steel frame, and a corrugated asbestos roof. The walls were made of hollow concrete blocks. The interior of the building was equipped with new tools, machines, and automobile servicing devices imported with ICA dollar funds.

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[3] Daniel W. Bell and Others, Report to the President of the United States by the Economic Survey Mission to the Philippines, Department of State Publication 4010, Far Eastern Series 38 (Washington: Government Printing Office, October 9, 1950), p. 95.

[4] Ibid., pp. 4-5.

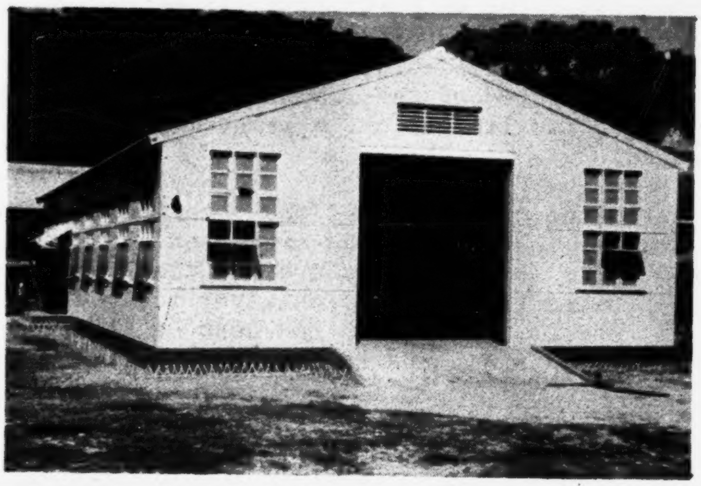

Fig. 2—After ICA-NEC Assistance. The Automechanics Shop at the Western Luzon SAT.

Figure 3 shows the interior of the machine shop at the Iloilo SAT prior to the start of the ICA-NEC assistance project. The shop was equipped with old Japanese war reparations machinery. Much of the machinery had been received from Japan with broken or missing parts.

Fig. 3—Before ICA-NEC Assistance. The Machine Shop at the Iloilo SAT.

Only four or five machines were in operating condition and these were barely serviceable. The machines were poorly arranged and were driven by a crude, inefficient, and unsafe overhead shaft contrivance. Hand tools and vises were in very short supply and there were almost no measuring tools.

Figures 4 and 5 show the machine shop at the Iloilo SAT after the receipt of ICA-NEC assistance. The shop was equipped with new lathes, a modern shaper, milling machine, drill press, ample hand tools, vises, and measuring tools, all imported with ICA dollar funds. The imported equipment was supplemented with new workbenches and tool cabinets made from lumber purchased with ICA-NEC peso funds. The machinery was arranged for efficient instruction and the shop was neatly painted and well lighted.

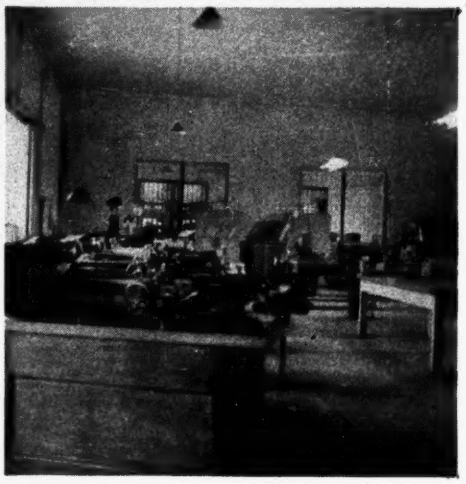

Fig. 4—After ICA-NEC Assistance. The Machine Shop at the Iloilo SAT.

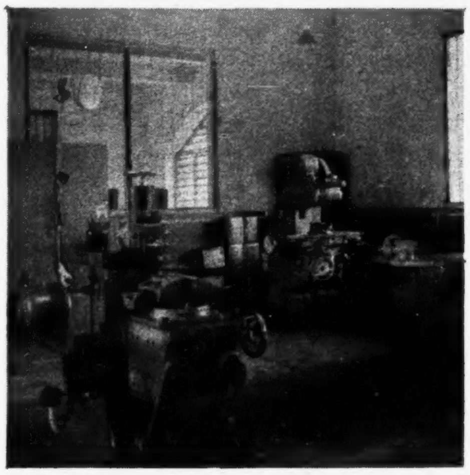

Fig. 5—After ICA-NEC Assistance. The Machine Shop at the Iloilo SAT.

Figure 6 shows a makeshift classroom building at the Iloilo SAT prior to the start of the ICA-NEC assistance project. The building had a dirt floor, wooden posts, and a galvanized iron roof. Large sections of the walls were incomplete, exposing the students and equipment to sun and rain.

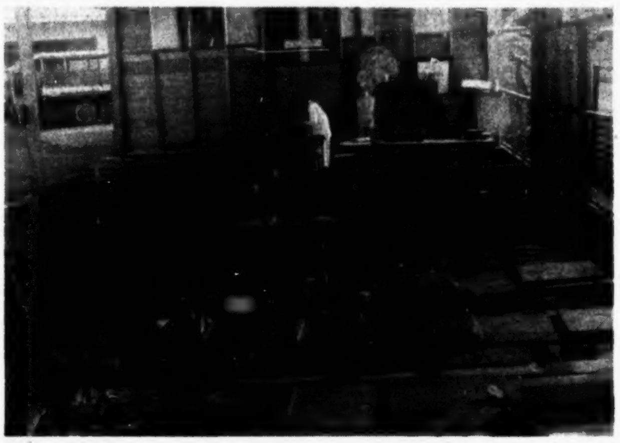

Fig. 6—Before ICA-NEC Assistance. Classroom Building at the Iloilo SAT.

Figure 7 shows a new classroom building constructed at the Iloilo SAT with ICA-NEC peso funds. The new building was complete and well made and was fully equipped with blackboards, lights, and classroom furniture.

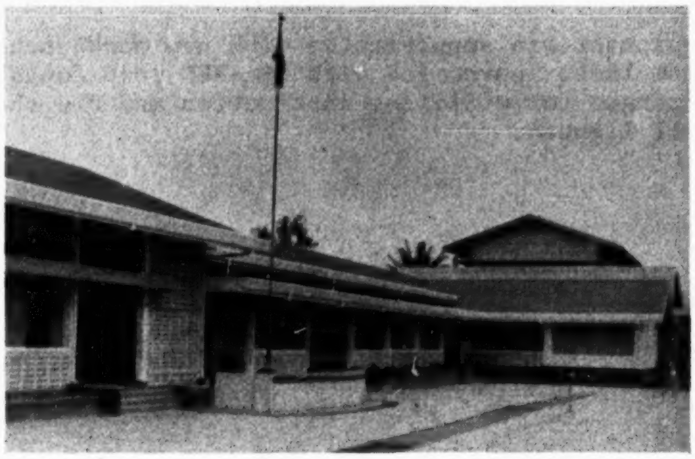

Fig. 7—After ICA-NEC Assistance. Classroom Building at the Iloilo SAT.

The photographs in Figures 1 through 7 represent typical examples of the physical improvements which were made at the vocational industrial schools throughout the Philippines as a result of the ICA-NEC assistance project. It is obvious that the new facilities provided a much better environment for teaching and learning than the facilities which were available prior to the receipt of ICA-NEC assistance. When to this point is added the fact that the vocational industrial teachers were given a great deal of technical assistance and in-service training in the use of the new equipment and facilities, it is reasonable to assume that more effective instruction in the vocational industrial courses resulted.

Although the Bell Report stated the objectives of the vocational industrial education project in a very brief and general fashion, the Yulo Report which contained the five-year plan for expanding and improving vocational industrial education described the objectives of the project in more detail. On the basis of the specific objectives stated in the Yulo Report,[5] the following accomplishments could be cited at the end of the first five years of the project operations:

1. Objective. Additional buildings are to be constructed at the existing vocational industrial schools. The sum of ₱403,750 is needed for this purpose each year for five years, a total of ₱2,018,750.

   Accomplishment. This objective was fully accomplished.

2. Objective. Additional instructional equipment, machinery, and classroom furniture are to be acquired for the existing vocational industrial schools. The sum of ₱740,680 is needed for this purpose each year for five years, a total of ₱3,703,400.

   Accomplishment. This objective was fully accomplished.

3. Objective. The following existing vocational industrial schools are to be converted into national schools of arts and trades: Zamboanga City Technical School (hereafter, TS), Leyte TS, Camarines Sur TS, La Union TS, Nueva Ecija TS. One school is to be converted each year for five years. The sum of ₱200,000 is needed for this purpose each year, a total of ₱1,000,000 for the five-year period.

   Accomplishment. This objective was more than accomplished. The 5 specified schools were converted into SAT's. In addition, 9 other existing schools were elevated to SAT status.

4. Objective. Five new national schools of arts and trades are to be established, one each year for five years. The first two schools to be established will be the Davao SAT and the Surigao SAT. The locations of the other three new schools will be determined later. The sum of ₱300,000 is needed for this purpose each year, a total of ₱1,500,000 for the five-year period.

   Accomplishment. This objective might be considered as fully accomplished. Actually, 4 new SAT's and 2 new trade schools were established, although only 3 of the SAT's and 1 of the trade schools received assistance under the vocational industrial education project. The proposed school in Surigao was not established. However, of the 6 new schools that were established, 1 was located in Davao.

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[5] Philippine Economic Survey Mission, Philippine Agricultural and Industrial Development Program (Manila, August 11, 1950). Summarized in Sidney C. High, Jr., The Joint Philippine-American Project for Expanding and Improving Vocational Industrial Education in the Philippines 1951-1956 (Doctoral dissertation, Department of Education, Stanford University, 1960), pp. 193-97.

5. Objective. The national funds available for the operation and maintenance of the vocational industrial education program are to be increased to ₱2,881,500 per year. These funds will be used for the operation and maintenance of the national schools of arts and trades, for the operation and maintenance of the teacher education departments at the Philippine SAT, Iloilo SAT, and Cebu SAT, for national aid in the operation and maintenance of provincial and city trade schools and vocational high schools, for the creation and maintenance of 184 new teaching positions in the vocational industrial schools, and for the operation and maintenance of the Trade and Industrial Education Section of the Bureau of Public Schools.

   Accomplishment. This objective was more than accomplished. The national funds provided for the annual operating expenses of the vocational industrial education program rose from approximately ₱423,000 in FY '51 to about ₱3,557,000 in FY '56.

6. Objective. Attention is to be given to the pre-service training of new teachers and to the upgrading of teachers now in the service. The teacher education departments at the Philippine SAT, Iloilo SAT, and Cebu SAT will be strengthened, and selected teachers will be sent abroad for advanced training.

   a. The teacher education departments will be strengthened by increasing the funds available for their operation (included in 5 above) and by converting their present two-year teacher education curriculum to a four-year collegiate curriculum culminating in the degree of Bachelor of Science in Industrial Education. Teachers now in the service will thus be able during vacation periods to undertake further studies leading to the B.S. degree, and new teachers will receive four years of training and the B.S. degree before entering the service.

      Accomplishment. This objective was fully accomplished.

   b. To assist in improving the teacher education departments, a foreign expert in vocational industrial teacher education will be invited to come to the Philippines for a period of one year. A request is to be made to the United Nations or the United States to furnish the dollar costs of the expert. The peso costs of the expert, including transportation and allowances while in the Philippines, are to be furnished by the Philippines Government. The sum of ₱9,530 is needed for this purpose for one year.

      Accomplishment. This objective was more than accomplished. By the end of FY '56, dollar funds had been obligated to finance 699 man-months of Type C technical assistance in industrial and industrial arts teacher education. As FY '56 drew to a close, a Stanford University contract team of 8 American specialists in vocational industrial teacher education was beginning work at the Philippine SAT.

c. Sixteen selected teachers are to be sent abroad each year for 5 years for advanced training in various phases of vocational industrial education. A request is to be made to the United Nations or the United States to furnish the dollar costs of these 80 trainees. The peso costs for each trainee will be approximately ₱2,000 (₱1,500 for round-trip transportation to the country of training and ₱500 for clothing allowance). The peso costs are to be furnished by the Philippines Government. The sum of ₱32,000 is needed for this purpose each year, or a total of ₱160,000 for the 80 trainees to be sent abroad during the five-year period.

Accomplishment. This objective was not quite realized. Between FY'52 and FY '56, the number of trainees sent abroad under the ICA program was 55 and 6 trainees were sent abroad under other programs (Colombo Plan and International Labour Organisation). In addition, ICA dollar funds were obligated at the close of FY '56 to finance the sending abroad of 10 more trainees. Thus by the end of FY '56, 71 trainees either had been sent abroad or were in the process of going abroad. This total of 71 fell slightly short of the original goal of 80 trainees.

7. Objective. A national advisory board on vocational education is to be created to advise the Secretary of Education on policies regarding the selection, training, placement, and progress of workers needed in agriculture, trades and industries, and business.

Accomplishment. This objective was partially accomplished. A national advisory board on vocational education was created by the President of the Philippines. However, the board failed to develop into an important policy-making body and was largely ineffective.

8. Objective. The present Division of Vocational Education in the Bureau of Public Schools is to be converted into an Office of Vocational Education to be placed directly under the Department of Education. This new office will be responsible for the supervision of all vocational schools, both public and private. The present Trade and Industrial Education Section in the Division of Vocational Education is to be converted into a Trade and Industrial Education Division in the new Office of Vocational Education. The present staff of the Trade and Industrial Education Section will be augmented by the addition of a supervisor of industrial teacher education and a stenographer (cost included in 5 above).

Accomplishment. This objective was partially accomplished. The Division of Vocational Education was not converted into a separate Office of Vocational Education. The central administrative staff in vocational education did, however, achieve semiautonomous status within the Bureau of Public Schools. The Trade and Industrial Education Section was elevated to a full-fledged Division and the staff of the new division was augmented by the addition of 19 professional employees and a number of clerical personnel.

9. Objective. The training program in the different areas of vocational industrial education is to be geared to the economic development program so that the trained workers can take part in it actively.

   Accomplishment. This objective was partially accomplished. The percentages of students enrolled in furniture making and building construction were reduced and the percentages enrolled in electrical and metalworking courses were increased. At a number of schools, facilities were developed for specialized courses in ceramics, printing, foundry, and diesel engines, and students were enrolled in these new courses. These shifts in enrollment tended to bring the training program more nearly in line with the general needs of the economic development program. However, the lack of detailed information on occupational trends and specific employment needs of the economic development program made it impossible to gear the vocational industrial training directly to the economic development activities.

10. Objective. Greater autonomy and flexibility are to be granted to local school administrators in operating the training programs. Auditing and accounting rules and regulations which handicap the training program are to be reduced to a minimum.

    Accomplishment. This objective was partially accomplished. Of the 35 schools in operation at the end of FY '56, only 21 were SAT's. These SAT's (except in a few cases where temporary vacancies existed) were headed by their own superintendents. The superintendents had greater "autonomy and flexibility" in budgetary, personnel, and instructional matters than had been possessed by the principals who had headed most of the vocational industrial schools prior to FY '52.

11. Objective. More intensive short-unit courses are to be organized and offered in the vocational industrial schools both for youths and for adults on a day and evening class basis to meet entrance requirements in areas where the projected industrial plants are to be established. These courses are to be conducted on the basis of a cooperative training program; that is, part of the training will be done in the school and part in the industrial plants.

    Accomplishment. Little had been accomplished toward this objective by the end of FY '56. A few schools had begun to develop evening courses and cooperative training programs, but on a national scale much remained to be done in this regard.

12. Objective. The enrollment in all public vocational schools is to be increased to a total of 60,000 students. This figure includes students enrolled in vocational industrial schools, vocational agricultural schools, vocational business and distributive education, and vocational homemaking education. It includes students enrolled at both the secondary and junior college levels. (No breakdown is given to indicate what proportion of the 60,000 students is to be accommodated in the vocational industrial schools.

Accomplishment. It is impossible to measure the accomplishment of the vocational industrial education project in relation to this objective, since no specific goal was set for the enrollment in the vocational industrial schools. Actually, the total enrollment in the vocational industrial schools increased from 21,208 in FY '51 to 30,769 in FY '56. Therefore, by the end of FY '56 the vocational industrial schools were accommodating more than half of the target enrollment figure for all types of public vocational schools.

In the Yulo Report, the estimated costs for carrying out the five-year plan were summarized as follows:[6]

a. Capital outlay (buildings and equipment)	
Combined dollar and peso funds equivalent to	₱8,222,150
b. Technical assistance	
Dollar funds to be requested from U.N. or U.S.	Not Stated
Peso funds	₱ 169,530
c. Continuing national government expenses for operation and maintenance (per year)	₱2,881,500

In actual practice, the costs during the first 5 years of operation of the vocational industrial education project were found to be:

a. Capital outlay (buildings and equipment)	
Dollar funds	$1,551,000
Peso funds	₱5,580,571
b. Technical assistance	
Dollar funds	$1,051,250
Peso funds	₱ 617,250
c. Special operational and administrative expenses generated by the assistance project	₱1,275,898
d. Continuing national government expenses for operation and maintenance (per year, as of FY '56)	₱3,557,000

When the actual costs are compared with the estimated costs, it can be seen that the actual expenditures for capital outlay were very close to the original estimate. If, for purposes of comparison, the dollar funds are converted to pesos at the official rate of exchange (₱2.00 for $1.00), the combined dollar and peso expenditures for capital outlay were equivalent to ₱8,682,571. This figure closely approximates the original estimate of ₱8,222,150 for capital outlay.

In the case of technical assistance, it is not possible to make a full comparison between the actual costs and the estimated costs, since the original estimate covered only the peso expenses and did not state the amount needed for dollar expenses. However, it will be noted that, for the peso costs alone, the actual expenditures for technical assistance were nearly four times as large as the original estimate. The expenditures for operation and maintenance were also considerably larger than the original estimate.

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[6] Ibid., pp. 196-97.

In general, the amount spent for capital outlay conformed closely to the proposals made in the Yulo Report, but the amounts spent for technical assistance and for operation and maintenance were much greater than were anticipated in the report.

About a year after the five-year plan for vocational industrial education was published in the Yulo Report, two amendments to the plan were made.[7] The first amendment consisted of a schedule showing the fiscal year in which each of the existing vocational industrial schools would be provided with ICA-NEC assistance. The second amendment increased the total number of proposed new schools from 5 to 11 and specified the locations and dates of establishment for the new schools.

When the schedule for assistance to existing schools is compared with the assistance project as actually carried out, the following tabulation is obtained:

Name of School[8]	Letter Designation[9]	Fiscal Year Scheduled for Assistance	Fiscal Year Actually Assisted
Iloilo SAT	Z	1951	1951
Bulacan TS	A	1952	1952
Pampanga TS	B	1952	1952
Tarlac TS	C	1952	1952
Misamis Oriental TS	D	1952	1952
Sulu TS	E	1952	1952
Zamboanga City TS	F	1952	1952
Cebu SAT	G	1952	1952
Nueva Ecija TS	H	1952	1952
Ilocos Sur TS	J	1953	1953
La Union TS	K	1953	1953
Rodriguez VHS	L	1953	1953

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[7] Ibid., pp. 200-202.

[8] In listing the names of the schools, the following abbreviations have been used: SAT, School of Arts and Trades; TS, Trade School; VHS, Vocational High School.

[9] Since the names of the schools have changed over the years, early in the operation of the vocational education project official letter designations were assigned to each of the schools for convenience in maintaining project records. These official unchanging letter designations appear in all tabular listings herein to provide a connecting link between sets of data at differing periods of time.

(Continued)

Name of School	Letter Designation	Fiscal Year Scheduled for Assistance	Fiscal Year Actually Assisted
Camarines Sur TS	M	1953	1953
Negros Oriental TS	N	1953	1953
Albay TS	O	1953	1953
Pablo Borbon Memorial TS	P	1953	1953
Cagayan TS	Q	1953	1953
Pangasinan TS	R	1953	1953
Capiz TS	S	1953	1953
Samar TS	T	1953	1953
Zambales TS	U	1953	1953
Philippine SAT	W	1953	1953
Ilocos Norte TS	X	1954	1953
Aparri VHS	BB	1954	1953
Bohol TS	CC	1954	1953
Isabela TS	DD	1954	1953
Leyte TS	EE	1954	1953
Sorsogon TS	FF	1954	1953
Abellana VHS	AA	1955	1953

When the schedule for establishment of new schools is compared with the assistance project as actually carried out, the following tabulation is obtained:

School Location	Letter Designation	Fiscal Year Scheduled for Establishment	Fiscal Year Actually Established
Davao City	I	1952	1952
Bataan Province	V	1953	1953
Marinduque Province	Y	1953	1953
Negros Occidental Prov.	GG	1954	1953
Lanao Province	none	1954	not established
Baguio City	"	1954	"
Laguna Province	"	1954	"
Dipolog, Zamboanga Prov.	"	1955	"
Camarines Norte Prov.	"	1955	"
Mindoro Province	"	1955	"
Cotabato Province	"	1955	"

A comparison of the two proposed schedules with the actual operations of the vocational industrial education project by fiscal years reveals the following:

	Proposed Schedule	Actual Operations
FY '51		
Existing schools to be assisted	1	1
New schools to be established	0	0
FY '52		
Existing schools to be assisted	8	8
New schools to be established	1	1
FY '53		
Existing schools to be assisted	13	20
New Schools to be established	2	3
FY '54		
Existing schools to be assisted	6	0
New schools to be established	4	0
FY '55		
Existing schools to be assisted	1	0
New schools to be established	4	0
Summary		
Existing schools to be assisted	29	29
New schools to be established	11	4
TOTAL	40	33

This comparison shows that all 29 of the existing schools were assisted and that the assistance to existing schools was completed two years ahead of schedule. Of the 11 new schools proposed for establishment, 3 were assisted on schedule and 1 was assisted a year ahead of schedule. The remaining 7 schools were not established.

On the whole, the objectives of the vocational industrial education project, ranging from the general goals stated in the Bell Report to the more specific goals described in the Yulo Report's five-year plan with its amendments, were to a large extent accomplished during the first five years of the project operations. Except for the curtailment of the establishment of new schools, all of the projected expansion and improvement of physical facilities was fully accomplished. Some of the proposed adjustments and improvements in administration and in the instructional program were only partially accomplished, and in retrospect it is apparent that improvements of this type involve a gradual and continuing process extending over a period longer than five years. However, even in the case of those objectives which were only partially accomplished, essential groundwork was laid during the first five years on which further progress could be based.

It is important to note also several accomplishments of the project which extended beyond the scope of the original plans and objectives. The large-scale in-service training programs for vocational industrial teachers, supervisors, and administrators represented important accomplishments which were not outlined in the original planning. The marked expansion of the central administrative staff, the creation of a corps of specialized supervisors, the increase in school visitation, and the improvement in data collection and organization were accomplishments not called for in the original plan. The development of a nucleus of Filipino personnel to help the vocational industrial schools in inaugurating work in apprentice training and foreman and supervisory training was an accomplishment extending beyond the initial plans, as was the formation of the national professional organization of vocational educators, PAVE.

Another significant accomplishment not included in the original planning was the utilization of the Philippines vocational industrial education program for "third country training." As early as FY '53, United States assistance missions in neighboring countries began sending groups of Asian educators for observation and study to the Philippines vocational industrial schools. This practice, although not envisaged in the initial project plans, grew with the passage of time and served to extend the influence of the Philippines project into other countries of Southeast Asia.

On the basis of the progress made in all aspects of vocational industrial education in the Philippines between FY '51 and FY '56, and in terms of the objectives set forth in the Bell Report and the Yulo Report, the assistance project in vocational industrial education could be termed a success during its first five years of operation. Of course, at the end of FY '56 much remained to be done toward the development of a fully satisfactory program of vocational industrial education in the Philippines.

However, the objectives of the first five years of assistance had been substantially accomplished, a strong momentum of progress had been developed, and both the Philippines Government and the United States Government had expressed a continuing interest in the assistance project and an intention of budgeting additional funds for further improvements in vocational industrial education in succeeding fiscal years. On June 30, 1956, the Philippines vocational industrial schools could look back on five years of unprecedented development and improvement and could look forward to continuing progress in the future.[10]

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[10] A second study is scheduled to be undertaken in 1961 and the 10-year period from 1951 to 1961 is to be evaluated therein.

PROJECT STRENGTHS AND WEAKNESSES

Several strengths, as well as a number of weaknesses, are identifiable in the planning and execution of the joint Philippines--United States project for expanding and improving vocational industrial education. A basic strength of the project stemmed from the very existence of a comprehensive five-year plan. The plan served to coordinate and integrate the special assistance measures undertaken by ICA and NEC with the regular ongoing efforts of the Bureau of Public Schools to improve the vocational industrial schools. Because of the existence of a master plan, the assistance measures were not sporadic and haphazard, changing in direction from one fiscal year to the next, but were continuous and organized, moving consistently toward definite goals.

The five-year plan itself derived strength from the fact that it was prepared by the Filipino vocational educators, was based on their own assessment of their needs, and reflected their own desires concerning the steps to be taken for the improvement of vocational industrial education. Because of its origin with the Filipinos themselves, the plan was ensured from the start the wholehearted cooperation and support of the Filipino vocational educators and, in addition, was probably sounder in many respects than a plan that might have been prepared by foreign experts who were not thoroughly familiar with Philippines conditions.

The five-year plan derived further strength from the fact that it was endorsed and supported by the national leaders responsible for planning for the overall economic development of the Philippines. The importance of vocational education as a component of economic development was recognized in the report of the Joint Preparatory Committee on Philippine Affairs in 1938, and subsequent economic reports and plans gave increasing attention to manpower training. When the Yulo Report was prepared in 1950, the five-year plan for the expansion and improvement of vocational industrial education was included as a definite part of the national economic development program. The interest and attention accorded the plan by the economic leaders of the Philippines assured it substantial financial backing and top-level administrative support and greatly facilitated its implementation.

The five-year plan was strong in its recognition of a wide range of problems to be dealt with in the Philippines vocational industrial education system. Instead of confining itself to a few isolated segments of the vocational industrial education program, the plan proposed simultaneous action to expand and improve the physical facilities of the vocational industrial schools, to bring about a better geographical distribution of the schools, to increase the enrollment, to expand the course offerings at the post-secondary level, and to increase the funds available for meeting the annual operating costs of the schools. Proposals were also made for strengthening teacher education, for revising and improving the administration of vocational industrial education at the national level, for creating a national advisory board on vocational education, and for relating the training in the vocational industrial schools more closely to the needs of the national economic development program. The broad nature of the plan established the basis for a comprehensive attack on all the prevailing problems and helped to prevent the bottlenecks and imbalances that might have resulted had attention been limited to only a few aspects of the total program.

The fact that the five-year plan called for the special ICA-NEC assistance to be absorbed directly into the regular framework of the Bureau of Public Schools constituted a strength. In some nations, assistance projects have been developed as semiautonomous operations, separate and distinct from the regular agencies of the host government. Difficulties have been experienced later in integrating the new projects with the regular ongoing activities of the permanent governmental agencies.

For example, in Iran certain agricultural assistance projects were established as separate operations. It was necessary later for the Iranian Minister of Agriculture to attempt to "weld these new programs into the framework of his ministry."[1] In Latin America, too, problems have been encountered in transferring to permanent local agencies certain activities which have been initiated as semiautonomous assistance projects.[2]

In the Philippines vocational industrial education project these difficulties were avoided completely, since the five-year plan provided for the ICA-NEC assistance to be channeled into the permanent organization of the Bureau of Public Schools and to be used to improve and expand the Bureau's regular activities.

Not to be overlooked are certain background strengths on which the five-year plan was based. In the first place, at the time the plan was prepared the Philippines already had a well-established public school system which provided elementary education for a high proportion of the nation's children. Thus, there existed a large reservoir of elementary school graduates from which students for the vocational industrial schools could be drawn. In the planning for the expansion of vocational industrial education, the existence of this reservoir of people possessing a basic education constituted an important factor, a factor not always present in newly developing nations.

In the second place, for some 15 years prior to the drafting of the five-year plan the growing mechanization and the expanding economic activity in the Philippines had been stimulating an increasing interest in and desire for vocational industrial education on the part of the Filipino people. This favorable attitude of the people toward vocational industrial education, another factor not always present in newly developing nations, was an important background consideration in the plans for expanding the vocational industrial schools.

In the third place, for many years relatively large numbers of Filipinos had been progressing through the secondary and collegiate levels

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1. William E. Warne, Mission for Peace: Point 4 in Iran (New York: Bobbs-Merrill Company, 1956), p. 223.

2. National Planning Association, Special Policy Committee on Technical Cooperation, Technical Cooperation in Latin America—Recommendations for the Future (Washington: National Planning Association, 1956), p. 112.

of education. Thus, many people were available who had received some form of advanced education and who, after rather short periods of specialized training, could be drawn into service on the expanding instructional and administrative staffs of the vocational industrial schools.

In the fourth place, at the time the five-year plan was prepared the Philippines Bureau of Public Schools had already had half a century of experience with help from the United States in developing vocational industrial schools. As a result of this previous experience, there existed an established organization, a corps of dedicated personnel, and a body of accepted concepts in the field of vocational industrial education.

Stemming from a strong background and possessed of several inherent strengths, the five-year plan nevertheless contained a number of weaknesses. In retrospect, it is obvious that the plan failed to place enough emphasis on technical assistance in relation to the emphasis on the expansion of physical facilities. With a projected capital outlay of more than ₱8 million, the plan provided for only one man-year of technical assistance by a foreign specialist in vocational industrial education. Actual experience in the implementation of the project demonstrated clearly the need for more than 30 man-years of technical assistance by foreign specialists.

Closely related to this first weakness was a second. The plan failed to anticipate fully the necessity for extensive in-service training programs for acquainting the vocational industrial teachers with the maintenance and operation of the new imported equipment. Although the plan mentioned briefly the need for upgrading the teachers in the service, no definite proposals were made and no funds were budgeted for the large-scale in-service training programs which were later found essential to the success of the project.

Another weakness in the plan was its failure to anticipate the necessity for large increases in the central administrative staff for vocational industrial education. Whereas the plan called for the staff of the Trade and Industrial Education Section to be augmented by the addition of 1 supervisor and 1 stenographer, it was actually found necessary to add 19 professional employees and several clerical personnel to the staff.

The plan also failed to anticipate the necessity for large increases in the number of superintendents of industrial education as heads of individual schools. Actually, in carrying out the project, 18 new positions were created for superintendents as heads of individual vocational industrial schools.

As a result of its failure to anticipate the necessity for large increases in the central administrative staff and in the number of superintendents of industrial education, the plan made no provision for selecting and training new administrative and supervisory personnel. This omission constituted one of the most serious weaknesses of the plan.

Although the original five-year plan as published in August 1950 called for the establishment of only 5 new schools, the amendment of September 1951 increased the total of proposed new schools to 11. The proposal for the establishment of 11 new schools over a five-year period proved to be unrealistic in terms of the administrative problems involved in constructing and equipping the physical facilities, the availability of competent faculty members and administrators, and the ability of the Philippines Government to provide adequate financial support on a continuing basis for so many new institutions. It is apparent that the plan was weak in calling for the establishment of too many new schools too soon.

There were weaknesses too in the budgetary provisions of the plan. Although the amount budgeted for capital outlay proved to be adequate, insufficient funds were budgeted for technical assistance and for the special operational and administrative expenses occasioned by the assistance project. It was also found that the estimates of the continuing operational expenses to be borne by the Philippines Government were too low. Attention should be called to the fact that the budgetary estimates of the plan would have been more useful if the amount needed for capital outlay had been broken down to show what proportion would involve purely peso expenditures and what proportion would require foreign exchange.

Moving from the five-year plan itself to a consideration of the actual execution of the project, several strengths might be cited. The execution of the project was characterized by a strong sense of direction, achieved by adherence to the course of action outlined in the five-year plan. With the course of action charted in advance, the project activities moved smoothly and steadily from one fiscal year to the next. While one step was being taken, the succeeding steps were clearly visible ahead, and when opportunities arose, it was possible to make immediate and effective use of surplus funds which other projects were not able to utilize.

The execution of the project was characterized by a concentration of resources on a definite set of tasks. In the early days of the project a clear policy statement was issued, limiting ICA assistance in vocational industrial education to activities which fell within the framework of the five-year plan. This policy statement served to prevent the dispersion of available manpower and funds among smaller, uncoordinated activities which, however worthwhile in themselves, did not contribute directly to the attainment of the major project goals.

The execution of the project was characterized by a continuity of policies, operations, and personnel. In the central office of the Philippines Bureau of Public Schools, there was marked stability among the personnel directly concerned with the implementation of the vocational industrial education project. Mr. Romulo Y. Mendoza, who was Chief of the Trade and Industrial Education Section at the time the five-year plan was drafted, retained his position throughout the period covered by this study. Mr. Mendoza's key assistants, including Mr. F. M. Apolinar, Mr. H. F. Belen, and Mr. Delfin Quirolgico, occupied their positions almost continuously throughout the five-year period.

On the United States side, five Type B industrial education specialists were assigned to the project during its first five years of operation. The first American specialist, Mr. Sidney C. High, Jr., overlapped for more than two years with his successor, Mr. George H. Spearman. Mr. Spearman, in turn, overlapped for a year with his three successors, Mr. Gene F. Liebendorfer, Mr. Robert P. Johnson, and Mr. Walter T. Lowe. The long periods of overlap of the American specialists, coupled with the stability of the Filipino personnel, made possible a high degree of continuity in the policies and operation of the project.

The execution of the project was characterized by a flexibility which enabled weaknesses in the original plan to be corrected, unforeseen difficulties to be overcome, and emerging problems to be dealt with effectively. For example, although the original five-year plan was weak in providing for only one man-year of technical assistance by a foreign specialist in vocational industrial education, during the execution of the project, adjustments were made to provide for a substantial increase in technical assistance. Although the original plan failed to anticipate the necessity for extensive in-service training programs for the vocational industrial teachers, in the execution of the project, large-scale in-service training programs were organized, financed, and operated. Although the original plan failed to anticipate the necessity for large increases in the central administrative staff for vocational industrial education, as needs arose in the execution of the project, substantial additions were made to the central staff. Although the original plan made no provision for the training of new administrative and supervisory personnel, in actual practice a series of short training conferences and seminars for administrators and supervisors was conducted. While the five-year plan as amended called for the establishment of 11 new schools, when this number was found to be too large, it was reduced to a more appropriate figure. Thus, while the project was executed along the general lines set forth in the five-year plan, unreasonably rigid adherence to the details of the plan was avoided and a desirable degree of flexibility of action was achieved.

The execution of the project was strong in the employment of a balanced combination of Type A, Type B, and Type C technical assistance. Through Type A technical assistance, a corps of Filipino specialists in industrial education was developed. As these Filipino specialists completed their training in the United States and returned to the Philippines, they moved into key positions where they were available to render continuing service over a period of many years in the teaching, supervision, and administration of vocational industrial education.

In the meantime, while the corps of Filipino specialists was being developed, Type B technical assistance was used to furnish United States industrial education specialists for service in the Philippines. These Type B American specialists, working on a government-to-government basis, assisted the Philippines Bureau of Public Schools in the overall implementation of the joint project. In their constant day-to-day work with their Filipino counterparts, the United States specialists not only helped in the actual carrying out of the project but also, in the process, provided a great deal of on-the-job training to the Filipino industrial educators.

After the urgent problems of physical expansion and in-service training had been dealt with, Type C technical assistance was initiated to help in long-range improvement of pre-service industrial teacher education. The Type C United States specialists, serving under a Stanford University contract and assigned to two special vocational industrial schools, would be available over a period of years to work on an institution-to-institution basis in developing an effective permanent program of industrial teacher education.

Thus, all three types of technical assistance were employed, and each type was assigned a role to which it was particularly suited. In combination, the three types constituted a balanced and well-rounded whole.

In connection with the Type A technical assistance, one point deserves special mention. In addition to the vocational industrial teachers and supervisors who were enrolled in United States technical schools and universities for specialized training, several high-ranking vocational industrial administrators were sent to the United States for travel and observation. Upon their return to the Philippines, these administrators, having familiarized themselves with the United States industrial education system and having seen at first hand the types of training that their subordinates were receiving, showed increased sympathy and understanding for Type A technical assistance and exerted special efforts to insure maximum utilization of returning trainees. Thus, the overall effectiveness of the Type A technical assistance was strengthened by the inclusion of a few top Filipino administrators along with the younger, more specialized personnel.

In the execution of the project, the emphasis on field trips constituted a strength. Throughout the five-year period, the American TA's and their Filipino counterparts made frequent visits to all of the vocational industrial schools throughout the nation. These visits, undertaken on a scale never before attempted in the Philippines, were extremely valuable in keeping the United States and Filipino personnel in Manila in close touch with conditions in the field. The visits were valuable, too, in pinpointing specific difficulties in the implementation of the project at individual schools and in bringing the know-how of the United States and Filipino specialists to bear on the solution of the problems.

Further strength was derived from the increased emphasis on the collection and organization of data concerning the vocational industrial schools. During the five-year period, great strides were made in improving the quantity and quality of information about the schools available to the central administrative staff. Data secured from frequent reports from the schools were combined with firsthand information gathered during field trips to provide a sound basis for decisions on the administration of the schools and on the implementation of the assistance project.

Several strengths were evident in the execution of the local currency phase of the project. The counterpart project agreements which were drawn up to govern the use of peso support funds proved to be sound and effective. Especially valuable were the provisions in the agreements which authorized the Vocational Education Division of the Bureau of Public Schools, NEC and ICA to inspect the individual schools, to evaluate the use of both peso-financed and dollar-financed commodities, and to transfer to other schools or to other projects any commodities which were not utilized properly. Although in actual practice it never became necessary to transfer commodities from any of the schools, the very fact that such transfers were authorized served to stimulate better use of the equipment and materials furnished under the assistance project.[3]

The system used to provide the schools with locally-constructed furniture and equipment worked well. Counterpart funds were used primarily for the purchase of lumber, screws, shellac, and other materials, and the furniture was constructed by the woodworking classes. As a result, the schools obtained a maximum amount of furniture per peso of expenditure. In addition, the students gained valuable experience in the use of tools and machines and, by participating actively in the improvement of the school, developed a feeling of pride in and responsibility for the school facilities.

The practice of having the new shop and classroom buildings constructed by private firms under contract was found to be satisfactory and was a definite improvement over the traditional method of having school buildings erected by the Bureau of Public Works. Also satisfactory was the practice of releasing counterpart funds to certain selected schools and allowing them to construct their own buildings according to blueprints prepared by the Bureau of Public Schools and approved by NEC and ICA. In the case of schools with strong building construction departments, this latter practice resulted in good buildings with a maximum amount of floor space per peso of expenditure and, at the same time, provided the building construction students with an unsurpassed opportunity to gain experience on real jobs.

The procedure followed in developing and introducing the new steel frame type of shop building was effective. The original design for the building grew out of consultations between an experienced ICA architect and staff members of the Vocational Education Division of the Bureau of Public Schools. Under the first counterpart project, a few prefabricated steel frames were imported from the United States and about a dozen of the buildings were erected. On the basis of the experience gained with the first buildings, certain weaknesses in the original design were corrected and the blueprints and specifications were refined. Arrangements were made to have steel frames fabricated in quantity by a private firm in Manila. Then under subsequent releases of counterpart funds and lump-sum appropriations, contracts were awarded to private construction firms for the erection of large numbers of the buildings at vocational industrial schools throughout the Philippines.

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[3] The effectiveness of the "transfer provisions" indicates that it might have been possible and desirable to include in the counterpart project agreements even more detailed stipulations about the instructional programs in the individual schools. For example, the counterpart project agreements might have set forth definite standards concerning maximum class size, amount of floor space per student, types of instruction, etc., and might have provided for assistance to be withdrawn from any school which failed to maintain the standards.

In the execution of the dollar commodity phase of the project, there were a number of strengths which might be mentioned. The careful on-the-spot surveys of the equipment on hand at the vocational industrial schools and of the needs of the schools for additional equipment provided a sound basis for the ordering of appropriate dollar commodities. The drafting of a master list of specifications for tools, machines, and books facilitated the preparations of the successive firm requests for imported commodities.

The fact that the dollar-financed equipment was not all ordered at once but was obtained through a series of firm requests spaced over a three-year period proved to be an advantage. On the basis of the experience gained with the earlier "firm requests," the specifications for equipment were refined and improved in the "firm requests" which followed. Also, the experience gained at the Iloilo School of Arts and Trades in receiving and installing the equipment ordered under the first small "firm request" provided valuable guidance for handling the large shipments of equipment which arrived under the later "firm request."

The use of the last "firm request" to order supplemental equipment for all of the schools increased the effectiveness of the dollar commodity phase of the project. In spite of careful planning, certain important tools and machines were overlooked in the original equipment orders. Also, as the project developed it became apparent that several well-administered schools could absorb and make good use of larger quantities of equipment than had been provided under the initial "firm requests." By using the last "firm request" for ordering supplemental equipment for all of the schools, it was possible to fill the gaps in the previous equipment lists and to provide extra equipment for schools which needed it and had demonstrated their capacity to use it effectively. This feature of the project was so important that it would seem prudent in future planning always to budget funds in the latter stages of a project for the ordering of supplemental equipment.

The procurement of the dollar commodities through the normal commercial channels of Philippines import trade worked satisfactorily. Some initial difficulties were experienced when the Procurement Branch of NEC took bids and awarded contracts for equipment without consulting with the Vocational Education Division of the Bureau of Public Schools or with the ICA industrial education specialists. However, after procedures were set up to insure that the Vocational Education Division personnel and ICA specialists would assist in evaluating bids, the initial difficulties were overcome and good equipment was secured. The fact that the bids were taken in Manila and the contracts were awarded to local importing firms made possible a close liaison between the suppliers of the commodities, the procurement officials, and the vocational educators who would be the ultimate users of the equipment. In many respects, this arrangement was superior to having the commodities procured thousands of miles away by United States Government procurement services in Washington.

In the early stages of the project, the procurement of dollar commodities was quite slow. Twenty months elapsed between the time that the first "firm request" was prepared and the time that 50% of the equipment had reached the Philippines. However, as the project progressed the procurement cycle was speeded up, and only 12 months elapsed between the time that the last "firm request" was prepared and the time that 50% of the equipment had reached the Philippines. In general, the length of time required to procure dollar commodities did not represent a serious handicap, since equally long or longer periods of time were required to construct buildings and to make other arrangements for housing and utilizing the incoming equipment.[4]

The practice of having the bulk shipments of imported commodities received, sorted, recrated, and distributed to the individual schools by private firms proved to be effective. The incoming equipment was handled efficiently and moved smoothly through Manila to the schools in the provinces. By utilizing the resources of private firms to carry out this task, the Bureau of Public Schools avoided the necessity for acquiring special warehouse facilities, setting up a temporary organization, and employing large numbers of workers to receive, handle, and tranship the imported commodities.

One of the most important strengths of the dollar commodity phase of the project was the continuous follow-up work which was done on the installation and utilization of the imported equipment. The conducting of in-service training programs for vocational industrial teachers, the calling together of superintendents and principals for discussions of the administrative problems involved in the implementation of the project, and the frequent visiting of the individual schools by the ICA industrial education specialists and their Filipino counterparts all served to stimulate prompt installation and better utilization of the dollar commodities. Without these extensive follow-up activities, the project might well have bogged down in a mass of unopened or misused equipment.

While there were many strengths in the execution of the project, there were also weaknesses to which attention should be called. One of the major weaknesses was the severe case of "administrative indigestion" which developed in the last half of FY '53 and continued throughout FY '54.[5] During this 18-month period approximately $1 million worth of imported commodities arrived in the Philippines for use in the vocational industrial education project. During the same period, counterpart funds totaling about ₱3 million were released to the project and construction of 41 new buildings and large amounts of shop and classroom furniture were undertaken. The absorption of so much dollar and peso assistance over such a relatively short period of time placed a great strain on the administrative machinery of the Philippines vocational industrial education system.

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[4] One additional method of offshore purchase of commodities has been tried in similar projects in other nations with great success. When University contracts are used for technical assistance, dollars can be allotted to the United States cooperating university and the institution assume the responsibility.

[5] The term "administrative indigestion" was coined by Mr. Edward S. Prentice, who was Deputy Chief of the ICA Mission at the time.

Expecially in the case of the peso assistance, serious delays were encountered. The use of counterpart funds was new in the Philippines at the time. These funds were to be handled through shorter and more direct channels than the ones used for the funds from the regular Philippines Government budget. However, the methods of handling and accounting for the counterpart funds had not been worked out in detail in advance. In the absence of well-established procedures for the use of counterpart funds, many of the administrators at the individual vocational industrial schools and in the central office of the Bureau of Public Schools were reluctant to begin spending the money. Eventually, a "Principal's Guide" was written and issued, setting forth detailed and systematic procedures for disbursing and accounting for the counterpart funds. Gradually, toward the end of FY '54, after much time had been lost, the administrative difficulties were overcome and the peso assistance was handled more efficiently.

The small staff which, at the beginning of FY '53, made up the Trade and Industrial Education Section of the Bureau of Public Schools had been working at full capacity during the initial stage of the project, which involved only planning and paper work. When confronted in the latter part of FY '53 with the much larger and more demanding tasks involved in the actual physical implementation of the project, the staff was strained beyond its capacity. To handle the mushrooming work load, it became imperative that more personnel be added to the Section. As emergencies arose and as special funds could be obtained, new positions were created. New staff members were pressed hastily into service without clearly defined duties and without well-established supervisory relationships. This rapid and haphazard expansion resulted in much confusion and inefficiency and in some respects contributed to, rather than alleviated, the problem of "administrative indigestion." Finally, at the beginning of FY '55 a major reorganization of the Trade and Industrial Education Section was necessary to bring order into the situation.

The execution of the project would have been stronger if the whole problem of "administrative indigestion" had been foreseen and avoided. The arrival of dollar commodities and the release of counterpart funds might have been "stretched out" over a longer period of time, to avoid the necessity for absorbing such a concentrated dose of dollar and peso assistance within an 18-month period. Detailed procedures for handling the counterpart funds might have been worked out in advance, and a guide or manual might have been issued at the time the first releases of funds were made. A rational plan might have been developed in advance for the systematic and orderly expansion of the Trade and Industrial Education Section. Measures such as these might have prevented excessive strain on the administrative machinery of the vocational industrial education system and strengthened the execution of the project.

A weakness in execution at the beginning of the project was the poor coordination between dollar and peso assistance. The budgeting and release of counterpart funds was started later and was carried out at a slower pace than the preparation of "firm requests" for dollar-financed equipment. As a result, the imported commodities ordered under the first few procurement authorizations arrived in the Philippines months before the counterpart-financed buildings were completed and ready to house the equipment. This problem was overcome in the later stages of the project when much better timing of dollar and peso expenditures was achieved. However, the overall execution of the project would have been stronger if, from the beginning, the peso counterpart assistance had been coordinated more carefully with the dollar assistance.

The fact that the proposed legislation for establishing new schools and converting selected trade schools into schools of arts and trades got out of control in the Philippines Congress constituted a weakness in the execution of the project. The five-year plan contained provisions for the establishment and conversion of certain schools on the basis of technical considerations and overall national needs. However, when the necessary legislation was requested from Congress, political factors became dominant and many acts were passed on the basis of narrow provincial interests. The project would have been stronger if the vocational educators had been more effective in convincing Congress of the importance of acting in accordance with a coordinated national plan rather than passing piecemeal, politically inspired legislation.

Another weakness in the execution of the project was the fact that many of the provincial governments reduced their financial contributions to the operating budgets of the vocational industrial schools as the national contribution was increased. This practice prevented the schools from reaping the full benefit of the increased national allotments and served to reduce the net gains in annual operating funds. The project would have been strengthened if the Philippines Congress had included in the national appropriation acts some sort of safeguards requiring the provincial governments to maintain their contributions at the existing level or even to make reasonable increases in their contributions in order to qualify for the additional national funds.

A related weakness was evident in the fact that, in spite of significant increases made over the five-year period, the regular operating funds available to the vocational industrial schools were never sufficient for the expanding operation of a fully effective instructional program. In the category of "Maintenance and Other Expenses," which excluded salaries and wages but included the purchase of expendable supplies for shops and classrooms, the expenditure per student rose from ₱15 in FY '51 to ₱28 in FY '55. However, careful estimates indicated that about ₱200 worth of expendable shop supplies per student were needed each year to provide for a satisfactory level of instruction. The project would have been much stronger if some means had been found for closing the gap between the funds needed and the funds actually available for operating expenses in general and especially for the purchase of expendable supplies.

During the execution of the project, it became apparent that a few of the principals and superintendents of vocational industrial schools were simply not capable of providing the dynamic leadership needed in a period of expansion and improvement. The fact that no satisfactory method was found for removing and replacing these ineffective administrators represented a weakness in the project.

An even more basic weakness was the failure of the project to develop any long-range program of leadership training. A few short training conferences were conducted for administrators and supervisors, and a number of principals, supervisors, and superintendents were sent abroad for study and observation. However, no organized, institutionalized system was set up for the continuing selection and training of new administrative and supervisory personnel. The project would have been stronger if a permanent university-level program had been established early for the preparation of leaders in vocational industrial education.

The fact that the national advisory board on vocational education, created at the beginning of the project, failed to develop into an important policy-making body and proved to be largely ineffective constituted a weakness in the execution of the project. Similar failures have been experienced in other nations. For example, a report on the development of a technical institute in Nicaragua states that:

> In the first days of planning the Institute, efforts were made to use an advisory council. However, because of certain cultural differences and the newness of the enterprise in the Nicaraguan setting, this plan was not successful.[6]

In spite of the admitted difficulties involved, if through more patience, tact, and skill on the part of the vocational educators the Philippines vocational advisory board could have been drawn into a useful and functional role, the execution of the project would have been improved.

The execution of the project was weakened by the lack of detailed data on the labor force and on occupational trends in the Philippines. In the absence of basic information of this kind, it was difficult to plan appropriate course offerings, to establish suitable enrollment figures for each type of course, and carefully to gear the vocational industrial training to the specific needs of the national economic development program. Several individual vocational industrial schools made laudable efforts to collect occupational information from their surrounding communities. However, this information tended to be sketchy, inaccurate, and localized, and did not provide an adequate basis for assessing the national needs for skilled workers in general or specifically for various trades. The task of collecting, organizing, and maintaining accurate, comprehensive, and up-to-date statistics on the national labor force required specialized skill and resources which were not available to the Bureau of Public Schools. It was generally agreed that this was a function which could best be performed by the Department of Labor, but by the end of FY '56 the Labor Department was not yet in position to supply the necessary information in sufficient detail and on a continuing basis. If, as recommended in the Bell Report,[7] an adequate system for the compilation of labor statistics had been developed in the Department of Labor, the vocational industrial education project could have been executed more efficiently.

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[6] Harvey K. Meyer, Technical Education in Nicaragua (Columbus, Ohio: Epsilon Pi Tau, Inc., 1958), p. 22.

[7] Loc. cit.

One more weakness that should be mentioned in the execution of the project was the lack of progress in the development of evening courses for employed workers, in-plant training courses, and cooperative training arrangements between the schools and industrial concerns. For the most part, the Philippines vocational industrial schools concentrated on regular in-school daytime courses for school age groups Although a few schools initiated evening courses and cooperative training programs with private firms, the progress made on a national scale was very limited. The project would have been stronger and would have made a more immediate contribution to the national economic development program if more determined efforts had been made to involve all the vocational industrial schools in part-time training for adult workers and in cooperative training activities with local industries.

In the preceding pages, some of the more important strengths and some of the major weaknesses in the planning and execution of the vocational industrial education project have been identified and discussed. These strengths and weaknesses, discernible in five years of actual experience in the operation of the Philippines project, will be taken into account in the next chapter in the formulation of guidelines for similar projects which might be undertaken in the future.

GUIDELINES FOR FUTURE PROJECTS

From the experience gained during the first five years of the joint Philippines-United States project in vocational industrial education, certain guidelines can be formulated for similar projects which might be undertaken in newly developing nations in the future. It is recognized, of course, that these guidelines, derived entirely from the Philippines situation in the 1950's, may not be fully applicable to the conditions found in other nations and in other years. However, it is felt that if allowances are made for the varying conditions in individual host nations, the guidelines will be helpful to persons responsible for the planning and execution of assistance projects in vocational industrial education in many areas of the world.

The guidelines might be divided into two categories, administrative and technical. The administrative category includes procedural guidelines for the overall planning and administration of the project. The technical category includes guidelines for the substantive content of a vocational industrial education project in a newly developing nation. The administrative guidelines will be treated first, followed by a statement of the technical guidelines.

Administrative Guidelines

1. An assistance project in vocational industrial education should be based on a comprehensive long-range plan. While the exact time span of the plan is not important, it is suggested that the span be not less than 5 nor more than 10 years. A period of less than 5 years would probably not be sufficient for a full cycle of programming, execution, and drawing together of the various elements of the project. On the other hand, a period longer than 10 years would involve too many guesses about probable conditions in the distant future.

2. To the maximum extent possible, the master plan should be prepared by the host nation's own vocational educators. It is fitting for foreign experts to offer suggestions and to outline a variety of procedures and possible solutions to prevailing problems. However, it is important that in finished form the plan be a product of the host nation's officials and be based on their own assessment of their needs and their own decisions concerning the steps to be taken for the development and improvement of vocational industrial education. Such an indigenous plan is most likely to receive the wholehearted cooperation and support of the host nation's leaders and vocational educators, and, in addition, will probably be better adapted to local conditions than a plan prepared in large measure by foreign specialists in vocational education.

3. Whatever its origin, the finished plan should be formally agreed upon and accepted by both the vocational educators of the host nation and the vocational education specialists of the foreign nation's assistance agency. To initiate a project without bilateral agreement on long-range plans and objectives is merely to invite friction, frustration, and failure. In the process of reaching agreement, the

foreign specialists must not adhere rigidly to the vocational education dogmas of the nation of their origin. There are several patterns and courses of action which can be followed in developing effective national systems of vocational industrial education. It is better to agree on any one of these courses of action and pursue it vigorously than to enter into protracted arguments over the relative merits of various possible patterns and procedures.

4. The master plan should have the endorsement and support of the national leaders responsible for planning for the overall economic development of the host country. In most newly developing nations the establishment of a suitable vocational industrial education program will require larger financial resources than are ordinarily available to the public school system. Also, it will usually be necessary in establishing the program to deviate from traditional educational concepts and long-standing administrative practices. The national leaders of economic planning will be in position to provide substantial financial backing from special economic development funds and to provide top-level administrative support for the actions necessary to carry out the plan. Their interest in the plan will greatly facilitate its implementation.

5. The master plan should have the endorsement and support of the appropriate committees of the national legislative body. Some phases of the plan will probably have to be authorized by special legislation. The continuing operational funds for the vocational industrial education program will have to be secured from the legislative body. Therefore, it is important that the legislators understand and endorse the plan. It is especially important that the legislators be impressed with the desirability of acting in accordance with a systematic national plan rather than passing piecemeal legislation based on narrow regional interests.

6. The master plan should take into account background conditions in the host nation, such as:

   (a) The percentage of children of elementary school age actually enrolled in school, and the size of the reservoir of people possessing a basic elementary education, who could be drawn into the vocational industrial schools;

   (b) The attitude of the people toward vocational education, and the extent of interest in and desire for vocational industrial education on the part of parents and students;

   (c) The approximate numbers of people who, in previous years, have progressed through the secondary and collegiate levels of education and who, after specialized training, could be drawn into service on the instructional and administrative staffs of the vocational industrial schools;

   (d) The previous experience of the host nation in developing and operating vocational industrial schools, and the status of the existing administrative organization, personnel, and concepts in the field of vocational industrial education;

(e) The availability, nature, and implications of statistics on the national labor force and on occupational trends;

(f) The host nation's economic development plans, including the amount of hydroelectric and other power to be developed, the availability of natural resources, the number and types of manufacturing plants to be established, the extent of road building, irrigation, and other public works projects to be undertaken, and the quantities and kinds of machinery and equipment to be imported.

7. Unless very special circumstances dictate otherwise, the master plan should provide for assistance in vocational industrial education to be channeled into the regular framework of the public school system and used to expand and improve the ongoing activities in vocational industrial education. The establishment of a vocational industrial assistance project as a semiautonomous operation, separate and distinct from the regular activities of the permanent educational agency of the host government, should be avoided.

8. The master plan should deal with the whole range of problems confronting the host nation's vocational industrial education system. Instead of confining itself to a few isolated segments, the plan should provide for simultaneous actions to improve all phases of the vocational industrial education program. In other words, the plan should not be limited only to the importation of shop equipment, or only to the construction of buildings, or only to curriculum development, or only to teacher education, but should include all of these and more. The broad nature of such a plan will help to prevent bottlenecks and imbalances that are likely to result if attention is limited to only a few aspects of the total program.

9. The plan should provide for sufficient technical assistance in relation to any proposed expansion of physical facilities. In the first 5 years of experience with the Philippines vocational industrial education project, 40% of the dollar aid funds were devoted to technical assistance, while 60% of the dollar funds were spent for capital outlay. Another rough measure of the relationship between technical assistance and capital expenditures is found in the fact that with a capital outlay of $1,551,000 and ₱5,580,571, the Philippines project during the first five years involved 632 man-months of Type A technical assistance, 125 man-months of Type B technical assistance, and advance payment on 699 man-months of Type C technical assistance. This amount of technical assistance was believed to be the minimum required to insure effective utilization of the facilities provided by the capital expenditures. While the exact proportion of technical assistance needed in relation to capital outlay will vary from nation to nation, the Philippines experience will serve at least to indicate a general ratio for consideration in future planning.

10. The plan should provide for a combination of the various types of technical assistance, balanced to meet the particular needs of the host nation. In nearly all cases a sizable provision for Type A technical assistance will probably be found desirable, so that selected

industrial educators from the host nation can go abroad for study and observation. Provision should be made for a relatively large group of teachers and supervisors to go abroad for extended periods of specialized training in technical schools and universities. Provision should also be made for some of the host nation's top vocational industrial administrators to observe the operation of industrial education programs in other nations and, if possible, to see at first hand the types of training that their subordinates are receiving while abroad. Some of this offshore observation and training should be done in nations that are also newly developing; nations of comparable development can aid one another.

To meet immediate needs for administrative and technical skills in the period before significant numbers of the Type A trainees have returned from abroad, it will probably be necessary in most cases to arrange for foreign vocational education specialists to work in the host nation. These foreign specialists can be secured either through Type B or Type C technical assistance, or both. Generally, Type B personnel should be provided to work with the host nation's central administrative staff for vocational industrial education and to assist in the government-to-government planning and execution of the overall assistance project. For the development and strengthening of particular institutions, such as teacher education schools, Type C personnel, from United States universities, working on an institution-to-institution basis under contract, will probably prove most effective.

11. If modern shop equipment is to be imported in quantity for the host nation's vocational industrial schools, the master plan should provide for extensive in-service training programs for the vocational industrial teachers. Experience with the Philippines project indicates that if modern imported machinery is to be properly installed, maintained, and used, the vocational industrial teachers must be given special training, perferably on the exact models and brands being imported. The master plan should, therefore, include detailed provisions for the administrative and financial arrangements for the in-service training programs, as well as provisions for a well-qualified staff of in-service training instructors. The instructional staff might be composed of returned Type A trainees, Type B personnel, Type C personnel, or a combination of two or more of these. The Philippines experience indicates that, especially for the first few in-service training programs, it would be desirable to combine either Type B or Type C personnel with a group of returned Type A trainees to form the instructional staff. As time goes on, the Type A personnel will gain experience and will be able gradually to take over complete responsibility for the operation of in-service training programs.

12. In addition to immediate in-service training programs for employed teachers, the master plan should provide for the long-range development of an effective and permanent pre-service teacher education program. The establishment of such a program will involve the development of a suitable teacher education curriculum and the staffing and equipping of an adequate teacher education institution. This

institution (or these institutions) must be capable of preparing a continuous supply of competent new teachers to meet the expansion and replacement needs of the nationwide vocational industrial education system over the years to come.

13. The master plan should take into account any expansion that might be needed in the central administrative staff for vocational industrial education as well as any increases needed in the number of administrators for individual schools. Certainly, if the plan involves the establishment of new vocational industrial schools, additional school administrators will be required. Also, the Philippines experience indicates that the heightened activity in vocational industrial education as a result of an assistance project requires an enlargement of the central administrative staff. The master plan should, therefore, provide for the systematic and orderly expansion of administrative and supervisory personnel in the central office and at the individual schools. Expansion according to a rational pattern will help to avoid the ill effects of "growing like Topsy."

14. The master plan should provide both for the in-service training of existing administrative and supervisory personnel and for the selection and training of new administrators and supervisors. The immediate needs for in-service training can be met by sending selected administrators and supervisors abroad for study and observation and by holding short training conferences and seminars for all administrators and supervisors. The long-range needs for administrative and supervisory training should be met by the development of a permanent, institutionalized program for the selection, training, and continuous upgrading of vocational industrial supervisors and administrators. Such a program should be established at the university level and should lead to the master's and doctor's degrees in vocational industrial education.

15. The master plan should provide for the establishment of advisory boards on vocational industrial education. These boards should be composed of labor and management representatives from the private sector of the economy as well as representatives from interested government agencies, such as the Department of Labor, Department of Public Works, and Department of Commerce and Industry. Advisory boards should be established at the national level and at the level of individual schools.

16. If the plan involves an increase in the number of vocational industrial schools, the proposed timetable should not call for the establishment of new schools faster than they can be housed, staffed, and provided with adequate and continuing operational budgets. Much time and administrative effort are required to obtain a satisfactory site and to arrange for the construction of suitable buildings for a new vocational industrial school. The Philippines experience indicates that the overburdened and still only partially trained central administrative staff in a newly developing nation would be hard pressed to plan and administer the construction of more than one or two new schools per year. Even more difficult than the problems of

physical construction are the problems of assembling a group of qualified and experienced administrators and teachers to staff a new school. In a nation of less than 25 million population, it is doubtful if more than one or two new schools could be opened each year without creating a serious drain on the staffs of existing institutions. Further, considering the budgetary difficulties of most newly developing nations, it is unlikely that sufficient operating funds could be provided from regular governmental sources to furnish continuing financial support for more than one or two new schools per year. It is necessary, therefore, that the master plan exhibit caution in scheduling the establishment of new schools.

17. The budgetary provisions of the plan should be based on careful and detailed cost estimates and should be expressed in terms of the amount of local currency needed and the amount of foreign exchange required. In many newly developing nations, the limiting factors will be the amount of local currency which can be made available for the implementation of the project. It is likely that the foreign assistance agency which is helping to carry out the project will be able to make fairly large sums of foreign exchange available. However, these foreign exchange funds will be useful only to the extent that local currency can be provided to support them.

In the first five years of operation of the Philippines vocational industrial education project, the total expenditures by ICA and NEC amounted to $2,602,250 and ₱7,473,719. In other words, for each $1.00 of foreign exchange furnished by ICA, it was necessary for NEC to provide ₱2.87 to meet the local currency costs of implementing the project. Little would have been accomplished by increasing the dollar contribution of ICA unless NEC had been in position to make a corresponding increase in the peso contribution.

Another way of analyzing the costs of an assistance project is in terms of the supporting funds needed to insure effective use of a given amount of imported equipment. During the first five years of experience with the Philippines vocational industrial education project, it was found that for each dollar's worth of imported equipment the following supporting funds were required:

₱3.60	for payment of importer's commissions, distribution of the imported equipment to individual schools, construction of buildings to house the equipment, installation of the equipment, and construction of wooden furniture to supplement the imported equipment;
$0.68	for the foreign exchange costs of technical assistance;
₱0.40	for the local currency costs of technical assistance;
₱0.82	for special operational and administrative expenses generated by the assistance project.

In other words, for each dollar's worth of equipment imported for the vocational industrial schools, supporting funds amounting to

$0.68 and ₱4.82 were required. Without these supporting funds it would not have been possible to handle, distribute, house, and install the equipment. Nor would it have been possible to train the local personnel in the maintenance and operation of the equipment or to introduce improved instructional and administrative practices. Had sufficient supporting funds not been provided, the mere importation of equipment would have done little to improve the nation's vocational industrial education program.

The foregoing comments have reference only to the special, nonrecurring costs of the assistance project, costs which were met from the economic development funds of ICA and NEC. Recognition must also be given to the fact that the regular recurring costs of operating the national vocational industrial education system increased sharply as a result of the assistance project. Naturally, as the vocational industrial schools were enlarged and provided with additional equipment, their needs for annual operating funds grew. During the first five years of experience with the Philippines project, the annual operating expenses of the vocational industrial schools increased by approximately two pesos for each dollar's worth of imported equipment received from ICA. This increase, which had to be met from the regular financial resources of the vocational industrial schools, was a permanent one that would require continuing funds year after year. It should be noted, too, that even this sizable increase in operating funds was not sufficient to provide for a fully effective instructional program and that a larger increase was needed.

A further budgetary consideration has to do with the necessity for the eventual replacement of equipment obtained under an assistance project. It is to be expected that after a reasonable number of years of normal usage, imported equipment will wear out and will have to be replaced. For example, suppose a certain type of vocational shop equipment can be expected to last for ten years. Suppose also that $500,000 worth of this type of equipment is imported for the vocational industrial schools of a host nation. Then it will be necessary for the host nation to set aside, on the average, $50,000 worth of foreign exchange each year to provide for the eventual replacement of the equipment. If the host nation does not do this, then, at the end of ten years, either the gains in equipment resulting from the assistance project will be lost or it will be necessary for the host nation to arrange for a new foreign assistance project to replace the worn-out equipment. In order to avoid either of these eventualities, the master plan should make long-range financial provisions for the regular replacement of equipment, including consumable parts and supplies such as tires, belts, tubes, batteries, grinders, welding rods, etc. Also, the plan should avoid calling for the importation of such large quantities of equipment that the host nation cannot reasonably expect to shoulder the normal replacement costs over the years to come.

In summary, the budgetary provisions of the master plan should be worked out carefully and should take into account the relationship of foreign exchange expenditures to: (a) local currency funds needed to meet the special, nonrecurring costs of implementing the assistance project, and (b) local currency funds needed to meet the increased costs of operating the expanded vocational industrial education system. Attention should also be given to the eventual need for maintenance and replacement of equipment obtained under the assistance project. Care should be taken that the proposed foreign exchange expenditures not exceed the capacity of the host nation to provide the necessary local currency supporting funds and to provide for regular replacement of the equipment furnished.

18. In order to provide the vocational industrial schools with sufficient operating funds for carrying on an expanded instructional program and for making full use of the facilities furnished under the assistance project, it is likely that the central government of the host nation will have to make large increases in its contribution to the annual operating budgets of the individual schools. If this is done, both the master plan and the national appropriation acts should contain some sort of safeguards requiring the provincial and local governments to maintain their yearly contributions to the vocational industrial schools at the existing level, or even to make reasonable increases in their contributions, in order to qualify for the additional national funds.

19. In the execution of the project, a strong sense of direction should be maintained. The course of action outlined in the master plan should be adhered to and the project should be guided smoothly and steadily forward, step by step, from one fiscal year to the next. (See 22 following.)

20. All available resources should be concentrated on the execution of the agreed upon project. Every effort should be made to prevent the dispersion of available manpower and funds among smaller, uncoordinated activities which, however worthwhile in themselves, would not contribute directly to the attainment of the major project goals.

21. During the execution of the project, continuity of policies, operations, and personnel should be maintained to the maximum extent possible. Personnel stability among the foreign specialists and the host nation's officials directly concerned with the implementation of the assistance project is very important. In case of necessary changes in personnel, replacements should be scheduled for long periods of overlap with their predecessors. Stability of personnel will contribute greatly to the maintenance of the desirable continuity in the policies and operations of the project.

22. The project should be executed in a flexible manner, so that weaknesses in the original plan can be corrected, unforeseen difficulties can be overcome, and emerging problems can be dealt with effectively. In other words, while the project should be carried out along the general lines set forth in the master plan, unreasonably rigid adherence to the details of the plan should be avoided and an appropriate degree of flexibility of action should be maintained.

23. Attention should be given during the execution of the project to

the collection, organization, and maintenance of accurate and up-to-date data on the vocational industrial schools. These data should be assembled in the central office of the national vocational industrial education system and should include statistics on enrollemt trends, faculty, budgets, floor space and types of buildings, electric power supply, and kinds and quantities of equipment available in the individual schools. The regular collection and classifying of dependable data should be developed as a permanent and continuing function of the central office, and the data should be used as a basis for making sound decisions on the implementation of the assistance project and on the routine administration of the vocational industrial schools.

24. In the execution of the project, the foreign specialists and the host nation's central administrative and supervisory personnel should make frequent field trips to visit the vocational industrial schools throughout the nation. In the early stages of the project, the field trips will provide an opportunity for the gathering of firsthand information about the status and needs of the individual schools. In the latter stages of the project, the field trips will enable the foreign specialists and the host nation's central office supervisors to give on-the-spot assistance to the individual schools on problems of equipment installation and maintenance, curriculum development, and introduction of improved administrative practices and teaching methods. Frequent field trips are extremely valuable in keeping the central office personnel in close touch with conditions in the field, and without these trips the plans and directives emanating from the central office tend to become unrealistic. It is very important, therefore, that administrative arrangements be made and travel funds be provided to sustain an extensive and continuing program of school visitation.

25. The periodic project agreements which are drawn up between the foreign assistance agency and the host government should set forth rather detailed standards to be maintained by the vocational industrial schools involved in the project. These standards should include maximum class size, amount of floor space per student, annual per student allotments of funds for shop supplies and materials, equipment maintenance procedures, and types of instruction. The project agreements should provide for assistance to be withdrawn from any school which fails to maintain the prescribed standards. Provision should be made for equipment which is withdrawn from an unsatisfactory school to be transferred to another vocational industrial school or, if necessary, to be transferred to a completely different activity, such as a public works project or an industrial development project. While it is to be hoped that in actual practice it will never become necessary to withdraw equipment from any of the schools, the very existence of the "transfer provisions" in the project agreements will help the foreign assistance agency and the host government to administer the project more effectively and will stimulate better performance on the part of the individual schools.

26. If items of wooden furniture (such as workbenches, tool panels, storage cabinets, drawing tables, desks, and bookcases) are to be

provided for the vocational industrial schools under the assistance project, consideration should be given to having this furniture made in the school shops. Local currency funds might be used for the purchase of lumber, screws, shellac, and other materials, and the furniture might be constructed by the woodworking classes at each school. The Philippines experience indicates that this procedure will result in a maximum amount of furniture for the money expended. In addition, the students will gain valuable experience in the use of tools and machines and, by participating actively in the improvement of the school, will develop a feeling of pride in and responsibility for the school facilities.

27. If the project involves the construction of new shop and classroom buildings for the vocational industrial schools, efforts should be made to design and introduce new types of structures which will represent an improvement over the traditional school buildings in the host nation. The new buildings should be durable, inexpensive, adapted to the local climate, and designed to fit the special functions for which they are intended. They should be planned on the basis of consultations between architects and vocational educators, both from the host nation and from the foreign assistance agency. After a new type of building has been designed, a few should be constructed and tested in actual use. On the basis of the experience gained with the first few structures, the blueprints and specifications should be refined before the buildings are erected in large numbers throughout the country.

28. When new buildings are to be erected, the various possible methods of arranging for the construction should be investigated carefully. In most nations, one possibility will be to have the buildings erected by the host government's Bureau of Public Works. It is possible that investigation will show this method to be slow, inefficient, and costly. The Philippines experience indicates that it is more satisfactory to have the buildings constructed by private firms under contract. Another method which, in some cases, can be highly satisfactory is to release local currency funds to selected schools and allow them to construct their own buildings according to approved blueprints. In the case of schools with strong building construction departments, this practice will result in good buildings with a maximum amount of floor space for the money expended and, at the same time, will provide the building construction students with an excellent opportunity to gain experience on real jobs. When individual schools are provided with money and authorized to construct their own buildings, they should be allowed to use any savings in funds to extend the size of the buildings. This will provide them with an incentive for efficient management of the construction job.

29. If commodities are to be imported from abroad for the vocational industrial schools, a careful on-the-spot survey of the status and needs of each school should be made prior to the placing of orders. This survey should include the types and quantities of equipment already on hand, the amount of floor space available and to be constructed, and the characteristics and amount of electric power available.

After the first few schools have been surveyed, specifications should be written for the equipment needed for these schools. In the writing of equipment specifications, the industrial education specialists from the foreign assistance agency should work closely with the host nation's industrial educators and should help them to draft accurate and technically sound specifications. When the specifications have been completed, an initial order should be placed for the imported equipment needed for the first group of schools. On the basis of the experience gained with the initial order, the equipment specifications should be refined and effective procedures should be developed for receiving, handling, and installing the imported commodities. Then another order should be placed for the equipment needed for the second group of schools, followed by an order for equipment for the third group of schools, etc., until all schools have been covered. The practice of handling the schools in small groups and spacing out the equipment orders over a period of time is preferable to the ordering of all equipment at once. By spacing out the orders, it is possible to improve each succeeding order on the basis of the experience with the preceding ones, and the work load of handling the incoming equipment is spread over a longer period of time and reduced to more manageable proportions.

After all schools have received their imported equipment, a follow-up survey should be made. This survey will probably reveal that a number of important tools, machines, and accessories were overlooked in the original equipment orders. It may be found also that several well-administered schools need, and have demonstrated their ability to make good use of, larger quantities of equipment than were provided under the original orders. On the basis of the follow-up survey, an order should be placed for supplemental equipment to fill the gaps in the original orders and to provide extra equipment for certain schools.

30. There are various possible procedures for the procurement of imported commodities. The Philippines experience indicates that the procedure of procuring the commodities through the host nation's normal commercial channels of import trade can work satisfactorily. If this procedure is used, arrangements should be made for the host nation's industrial educators, as well as the foreign industrial education specialists, to assist in evaluating the bids submitted by the importing firms. The complex task of evaluating bids on vocational industrial school equipment should not be attempted by the host nation's procurement officials alone, without the advice of the industrial educators who will be the ultimate users of the equipment. Whatever the procedure used for procurement of imported commodities, constant efforts should be exerted to reduce the procurement time. Government procurement seems to have a natural tendency to be slow and to become slower. However, experience with the Philippines project has demonstrated that the procurement cycle can be speeded up considerably if all parties concerned will strive constantly to reduce the time required for each step. Again, it should be noted that in certain instances the offshore purchasing can be done most effectively by a United States university under contract to supply technical assistance.

31. The Philippines experience suggests that arrangements should be made to have the bulk shipments of imported commodities received, sorted, recrated, and distributed to the individual schools by private firms that have the personnel and facilities to do the job. By utilizing the resources of private firms to carry out this task, the host nation's Department of Education will avoid the necessity for acquiring special warehouse facilities, setting up a temporary organization, and employing large numbers of workers to receive, handle, and tranship the imported commodities.

32. After the imported commodities have been delivered to the individual schools, the host nation's central administrative staff and the foreign assistance agency's industrial education specialists should follow up continuously on the installation and utilization of the equipment. The individual schools will encounter many technical and administrative problems in installing, maintaining, and using the new equipment. Without constant stimulation and guidance from the central office, some schools will fail to solve these problems and will not derive the intended benefits from the imported commodities.

33. In the execution of the project, care should be taken to avoid periods of "administrative indigestion." Administrative indigestion occurs when imported commodities and local currency funds are fed into the project faster than they can be absorbed. As a result, excessive strain is placed on the administrative machinery of the vocational industrial education system, a backlog of work develops, and serious delays are experienced in the implementation of the project. Administrative indigestion can best be avoided by careful advance planning. The schedule for the arrival of imported commodities and the release of local currency funds should be stretched out evenly over a reasonable length of time, so that assistance will flow into the project smoothly and steadily without sharp peak periods of concentrated activity. Detailed procedures for the handling of imported equipment, the awarding of building contracts, and the disbursing and accounting for local currency funds should be worked out well in advance, so that when the time comes these operations can be performed rapidly and efficiently with a minimum of groping and experimentation. Needs for additional administrative and clerical personnel to cope with the growing work load should be anticipated, and a rational plan should be developed for the systematic and orderly expansion of the administrative staff. Participants must be sent abroad for training by a plan that will cause the least hardships on their colleagues who take up the added burden resulting from their absence. Measures such as these will help to prevent the occurrence of administrative indigestion and will improve the functioning of the project.

34. The operations financed with foreign exchange should be coordinated carefully with the operations financed from local currency funds. For example, if shop equipment is to be imported with foreign exchange and shop buildings are to be erected with local currency funds, accurate timing of the two operations is very important. If the equipment arrives before the buildings are ready, the equipment

will sit unused in crates, subject to deterioration, while the buildings are being completed. On the other hand, if the buildings are finished before the equipment arrives, the buildings will stand empty and useless pending the delivery of the equipment. In some instances unused buildings have been taken over by other agencies and permanently lost to vocational schools. Since the administrative channels for the expenditure of foreign exchange differ considerably from the channels for the expenditure of local currency, coordinated use of the two funds is difficult. However, by anticipating the time differentials between foreign exchange financed operations and local currency financed operations, it is possible to achieve reasonably accurate timing.

35. As the project develops, it will probably become apparent that, in spite of in-service training and other measures, some of the vocational industrial school administrators are simply not capable of providing the dynamic leadership needed in a period of expansion and improvement. The host government should devise and establish some satisfactory method for identifying, removing, and replacing these ineffective administrators.

36. During the execution of the project, constant efforts should be exerted to coordinate the work of the vocational industrial schools with the host nation's economic development plans and activities. The school officials should maintain liaison with the officials responsible for economic planning. Advisory boards should be developed and used to the maximum extent possible. The schools should cooperate with the national labor officials in collecting and organizing data on the labor force and on occupational trends. These data should be kept current and should be used as a basis for making adjustments in the vocational industrial courses.

37. As opportunities arise, the vocational industrial schools should be encouraged and assisted to develop special advanced courses, evening courses for employed workers, foreman and supervisory training programs, and apprentice training programs. In many newly developing nations the vocational industrial administrators will tend to think primarily in terms of regular in-school daytime courses for school-age groups. Such courses are important and, in accordance with the desires and interests of the local administrators, may well serve as the focal point for an assistance project. However, while the day trade courses are being strengthened and improved, concepts of the broader responsibilities of vocational industrial schools should be introduced. The project will be more effective and will make a more immediate contribution to the national economic development program if the vocational industrial schools can be stimulated to broaden their activities and to engage in part-time training for adult workers and in various types of cooperative training activities with local industries.

Technical Guidelines

On the basis of the Philippines experience, the following tentative guidelines have been formulated for the technical content and structure of vocational industrial education in a newly developing nation. These technical guidelines are suggestive only and represent one approach to the problem of providing an effective national system of vocational industrial education. There are, of course, other possible approaches and systems which might be used and which might prove more suitable to conditions in a particular nation. The technical guidelines will be discussed under 6 headings: a national plan for human resources development, the provincial or state school, the urban school or college, the central administrative staff, teacher education, and preparation of administrators and supervisors.

1. A National Plan for Human Resources Development

Any nation desiring to move forward rapidly in its gross national product must lay out a program of vocational education to prepare the manpower, the human resources, for the jobs to be done. Quotas for each category of skill and talent must be set and continually studied and reset. Once these quotas of trained manpower are available, then they need to be translated into training units, into schools and colleges in which the human resource development will primarily take place. Schools and colleges cannot be planned and located properly until the nation makes up its mind the direction and nature of its economic advance and has translated these national goals into a practical plan of training the necessary manpower. Such planning will of course determine whether there shall be primarily vocational schools for fishermen, for boat builders, for light industrial enterprises, or what not. The remaining 5 guide lines are all more or less dependent upon sound national planning--both in the public and the private sectors--of the desired nature and quantities of gross national product.

2. The Provincial or State Vocational Industrial School

In the broadly based type of national vocational industrial education system which is visualized in this discussion, the foundation would be the provincial or state vocational industrial school. Originally, these schools would be established only in the provinces or states most affected by the national program of mechanization and the introduction of modern equipment. However, it is to be anticipated that as the nation develops economically a school of this type eventually would be needed in practically every province or state.

No school exactly like the one proposed here was actually constructed in the Philippines. The school herein proposed represents a composite of ideas from several of the Philippines schools.

The proposed provincial or state vocational industrial school would be located in the provincial or state capital and would offer a four-year program to boys and girls from 14 to 18 years of age who had completed at least 6 years of elementary school. If conditions in the host nation would permit, it would be preferable for the school to offer a four-year program to youths from 16 to 20 years of age who had completed at least 2 years of general high school.

The size of the provincial or state vocational industrial school would, of course, vary from place to place, depending on the size of the population, the extent of mechanization within the state or province, and other factors. However, for purposes of the present discussion it will be assumed that the school would accommodate an enrollment of 500 students; that is, 20 classes of 25 students each. Half of the students (10 classes of 25 students each) would take their shop courses in the morning and their related classroom subjects in the afternoon. The other 250 students would take their related classroom subjects in the morning and their shop courses in the afternoon.

Each student would be permitted to enroll for four years of training in any one of the following five broad occupational areas:

Woodworking
Mechanics
Metalworking
Electricity
Building Construction

The training would be designed to prepare the student for the broad occupational responsibilities typical of provincial or state employment. For example, a student who enrolled in mechanics would receive training in both gasoline and diesel engines. He would study automobiles, trucks, tractors, diesel-electric generators, irrigation pumps, and possibly inboard and outboard boat engines. Upon completion of his training he would be prepared to undertake the general types of maintenance and repair work which are encountered by mechanics in provincial or state areas.

A student who enrolled in metalworking would receive training in bench metalwork, sheet metal work, forging, welding, and machine shop work and would be prepared to handle the wide variety of general metalworking jobs which are encountered in the area.

A student enrolled in building construction would receive training in concrete work, carpentry, plumbing, house wiring, roofing, and the other types of work involved in constructing the relatively simple dwellings and buildings found in the provinces or states. Similarly, students who enrolled in woodworking and in electricity would receive a broad and diversified type of training.

In addition to the shop courses, each student would take classroom subjects such as mathematics, science, drawing and blueprint reading, national language, technical English or another language with heavy industrial usage, history, sociology, and economics. Time would also be allotted for health and physical education and possibly for premilitary training.

It is anticipated that upon completion of this schooling most of the students would remain in their home province or state to fill the growing number of jobs connected with the improvement and economic development of the area. If a few of the students desired to pursue further studies, they could proceed to a higher level vocational industrial college in the national capital or in some other large urban center. This higher type of education will be discussed under a later heading.

The provincial or state vocational industrial school for 500 students would require shop buildings with a total floor area of approximately 19,200 square feet. These shop buildings would house the following 10 shops:

- Machine Woodworking Shop
- Bench Woodworking Shop
- Woodfinishing Shop
- Building Construction Shop
- Electricity Shop
- Advanced Mechanics Shop
- Beginning Mechanics Shop
- Sheet Metal Shop
- Forging and Welding Shop
- Bench Metal and Machine Shop

The school would also require a classroom building and a small powerhouse for the school generator.

On the basis of the actual experience with the Philippines vocational industrial education project from FY '52 through FY '56, it is possible to make fairly close estimates of the costs of establishing a 500-student provincial or state vocational industrial school of the type described above. The dollar costs which follow are based on 1954 price levels for machinery, equipment, tools, and books on the European and United States markets. The dollar cost estimates include shipment from the United States and Europe to the Philippines. The local currency cost estimates are expressed in terms of Philippines pesos and are based on 1954 price levels in the Philippines. If these estimates are used in future years and in other nations, they will have to be adjusted to take into account fluctuations in price levels, and freight rates, and variations in the purchasing power of different local currencies.

Dollar Costs

a. Machinery and Large Equipment	$ 35,000
Includes all the items shown in column "HH" of Table 35,[1] plus the following items: Forge blower with four tuyère irons Eight anvils Automobile cylinder boring bar with vacuum chip remover Movie projector, 16 mm Filmstrip projector, 35 mm Opaque projector	
b. Diesel-Electric Generator Unit, 55 kilowatts	8,000
c. Hand Tools	9,000
For woodworking, metalworking, mechanics, electricity, and building construction	
d. Technical and Professional Library Books on Industrial Education Topics (900 volumes)	3,000
TOTAL	$ 55,000

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[1] High, op. cit., Chapter XIII. Reproduced herein. See Appendix, pp. 65-68.

Local Currency Costs

a. Buildings	
Three (3) shop buildings, with steel frame, concrete floor, concrete block walls, and corrugated asbestos roof. Each building to be 40 feet wide by 160 feet long, or a total of 19,200 square feet for the three buildings. Estimated at ₱60,000 each, including heavy duty electrical wiring.	₱ 180,000
One (1) classroom building of wooden frame construction, with wooden floors, wooden walls, and corrugated asbestos roof. To contain 10 classrooms, 1 library, 1 science laboratory, and 4 small offices.	140,000
One (1) powerhouse for the school generator, with concrete floor, concrete block walls, and corrugated asbestos roof. To have 400 square feet of floor space.	3,000
Subtotal	323,000
b. Expenses involved in receipt of dollar-imported commodities	22,000
For payment of the local currency portion of the importers' commission on dollar commodities and for payment of handling and freight charges on the commodities from port of entry to the school site	
c. Other expenses	30,000
Fund to be advanced to the principal of the school for purposes such as the following:	
For purchase of office equipment such as typewriters, staplers, paper cutters, etc.	
For purchase of lumber, nails, screws shellac, etc., to be used to construct workbenches, tool cabinets, storage cabinets, drawing tables, library tables, shelves, desks, and other items of shop, classroom, and office furniture.	
For purchase of electrical and other materials needed for installation of imported shop equipment	
TOTAL	₱ 375,000

Summary of Costs

Dollar Costs	$ 55,000
Local Currency Costs	₱ 375,000

The above estimates of expenses involved in establishing a provincial or state vocational industrial school do not include the cost of the school site. It is assumed that the site would be donated by the government of the political division in which the school would be located.

After the school has been constructed and equipped, local currency funds would be required to meet annual operating expenses. The school would need a faculty and staff of at least 25 persons as listed below:

1	Principal or Superintendent
1	Assistant Principal and Head of Shop Department
1	Librarian
10	Classroom Teachers
10	Shop Teachers
1	Clerk
1	Janitor

At 1954 salary levels in the Philippines, this would require an annual expenditure of at least ₱60,000 for salaries.

The school would need expendable supplies amounting to about ₱200 per pupil per year. For an enrollment of 500 pupils, an annual expenditure of ₱100,000 would be required for supplies.

For maintenance and repair of buildings and equipment and for replacement of tools and library books the school would need at least ₱20,000 per year.

Thus the school would need local currency funds on a continuing basis at a level of about ₱180,000 per year to meet operating expenses.

It should be pointed out that the above cost estimates do not include facilities and teachers for training in foundry, printing, or ceramics. If these or other special courses were desired, additional dollars and local currency funds would be required.

It should be noted also that the estimates do not include provisions for courses in vocational home economics or girls' trades. In many places, it would be desirable for the provincial or state vocational industrial school to offer additional courses for girls. If this were to be done, the cost estimates for both the initial establishment and the subsequent operation of the school would have to be increased accordingly.

In the preliminary planning for an assistance project in vocational industrial education, the foregoing estimates might be used in two ways. First, if a certain number of students, say 2,000, are to be accommodated in new provincial or state vocational industrial schools of the type proposed here, the above estimates would be multiplied by four, resulting in the following totals:

Capital Outlay	
Dollars	$ 220,000
Local Currency	₱1,500,000
Operating Expenses (per year)	
Local Currency	₱ 720,000

Then, since the original estimates are based on 1954 price levels and Philippines local currency, the figures would be adjusted on the basis of current price levels and the local currency of the nation concerned.

Second, if existing facilities are to be renovated and converted into provincial or state schools of the type proposed here, the equipment already on hand and the available floor space would be deducted from the requirements outlined for a new school, and the estimates for capital outlay would be reduced accordingly. The presently available operating funds would be deducted from the estimated operating expenses to determine the increase needed in the yearly operating budget.

By following this procedure, it should be possible to arrive at reasonably accurate estimates of the costs of establishing and operating a nationwide network of provincial or state vocational industrial schools.

3. The Urban Vocational Industrial School or College

The national plan for economic development would call for something more than the aforementioned provincial or state school. The urban vocational industrial school or college would represent a higher level of vocational industrial education and would rest on the broad foundation provided by the provincial or state vocational industrial schools. As the name implies, the urban vocational industrial schools or colleges would be located in the national capital and in other large cities of the host nation. Since in most newly developing nations there are not many large urban centers, the urban vocational industrial schools or colleges would be few in number.

The urban vocational industrial school or college would offer a two-year program at the junior college level for students who had completed the provincial or state vocational industrial school. The size of the urban institution would, of course, vary from city to city, depending on the city population, the level of industrial development of the area, the number of feeder schools sending graduates to the urban school or college, and other factors. However, for purposes of the present discussion it will be assumed that a typical urban vocational industrial school or college would accommodate an enrollment of 1000 students.

In the urban institutions, students who had graduated from the provincial vocational industrial schools would receive more advanced training of a more specialized character. For example, a student who had completed the general metalworking studies in a provincial or state school might enroll in the urban school or college for two years of specialized training in the single area of machine shop. The training would consist of both shopwork and related classroom subjects. This advanced training would prepare the student for a specific job of the more specialized type characteristic of city employment. Some of the students who graduated from the urban vocational industrial school or college might be used to fill specialized jobs in large, modern manufacturing plants and other industrial establishments being erected as part of the national economic development program.

The course offerings of the urban vocational industrial schools or colleges would not be standardized but would vary from city to city, depending on the occupational pattern and the nature of the economic activity of the region being served. A typical urban institution might offer a dozen or more specialized courses such as the following:

- Wood Patternmaking
- Cabinetmaking
- Carpentry
- Masonry
- Plumbing
- Printing
- Ceramics
- Drafting
- Machine Shop
- Foundry
- Welding
- Sheet Metal Work
- Automotive Mechanics
- Diesel Mechanics
- Residential and Industrial Wiring
- Electrical Appliance Servicing
- Radio and TV Repair
- Motor & Generator Repair & Rewinding

This list is by no means complete. There are many other types of specialized courses which an urban school or college might offer to meet the needs of a particular city and region.

In addition to the regular daytime courses for school-age youths, the urban vocational industrial school would operate evening classes for employed workers to provide them with an opportunity for improving their skills. The urban school or college also might operate related classes for apprentices as well as foreman and supervisory training courses. The school would work in close cooperation with industrial management and labor groups and would maintain a flexible program, adjusted constantly to fit the changing requirements of the community.

An urban vocational industrial school or college might have two types of auxiliary departments. The first would be a secondary school department, providing secondary-level vocational industrial education for students who were residents of the city. Upon completion of the secondary school department, the city student either might seek immediate employment or might go on into the junior college level program, where he would join the students coming from the provincial or state vocational industrial schools.

The second type of auxiliary department would be a teacher education department. This department would operate a four-year college level program preparing teachers of industrial subjects. Teacher education departments would not be a feature of all urban vocational industrial institutions but would be attached to only one or two of the best urban schools or colleges in the nation. The teacher education department will be discussed in more detail under a later heading.

Since urban vocational industrial schools or colleges would vary considerably from city to city in their structure, organization, and course offerings, it is not possible to make accurate and detailed estimates of the costs of establishing and operating institutions of this type without prior knowledge of the communities in which they would function. However, it might be said in general that the costs of constructing and equipping an average urban school or college would be in the neighborhood of

$300,000 and ₱1,200,000. The annual operating expenses of the school would probably average about ₱540,000. As in the case of the provincial or state vocational industrial schools, these estimates are based on 1954 price levels and the local currency costs are expressed in terms of Philippines pesos. While the estimates are admittedly only rough approximations, they might be used as general guides in the preliminary planning for an assistance project in vocational industrial education.

4. The Central Administrative Staff

The national vocational industrial education system would be directed by a central administrative staff, located in the national capital and forming a part of the host nation's Bureau of Public Schools. The central administrative staff for vocational industrial education would be a division in a larger Vocational Education Branch within the Bureau of Public Schools.

The Vocational Education Branch might include, in addition to the industrial education division, an agricultural education division, a home economics division, a commercial education division, and a home industries division. The Vocational Education Branch would be headed by a person with the rank of Assistant Director of the Bureau of Public Schools. In its operations, the Vocational Education Branch might be semiautonomous and need not necessarily be bound by the regulations, procedures, and salary schedules applied to the academic branches of the Bureau of Public Schools. Experience in the Philippines has shown that the complex task of establishing and operating vocational schools involves problems quite different from those encountered in the administration of academic schools. It is difficult, if not impossible, to solve the vocational school problems within the framework of traditional regulations developed primarily for the conduct of academic education.

The central administrative staff for vocational industrial education, that is, the Industrial Education Division of the Vocational Education Branch of the Bureau of Public Schools, would provide leadership for the urban and provincial vocational industrial schools throughout the nation. The division would study the current and anticipated needs for vocational industrial graduates and would make long-range plans for meeting these needs. With the overall national interest in view, the division would plan for the establishment of new schools and the expansion of existing schools. The division would collect, organize, and disseminate information on enrollment trends and employment opportunities, would recommend the opening of new types of courses and the expansion or contraction of existing courses in various parts of the nation, and would assist in the placement of graduates of the vocational industrial schools.

Programs for the pre-service and in-service education of vocational industrial teachers would be developed and supervised by the division. The division would coordinate the curriculum development activities of the vocational industrial schools and colleges and would prepare and distribute instructional materials for the various courses. Personnel of the division would provide supervision and specialized assistance to the individual schools and colleges in the development of physical facilities and the improvement of the instructional program. The division would maintain a central library of films, filmstrips and other training aids and would make these available to the individual schools and colleges on a circulating basis. The division would also handle the routine administration of the vocational industrial education program, including the certification and appointment of teachers, the checking and processing of budgets, the apportionment of national funds appropriated for the vocational industrial schools and colleges, and the enforcement of prescribed standards for the operation of vocational industrial courses.

To perform its functions, the division would have a staff consisting of a division chief, one or more assistant division chiefs, a group of general supervisors, a group of specialized supervisors, and a supporting group of draftsmen and clerks. If an expansion program were under way, involving the construction and equipping of a large number of new classrooms and laboratories and shops, a group of architectural and engineering personnel would be included on the staff.

Arrangements would be made for many of the staff members, particularly the specialized supervisors, to go abroad for one or more years of study in an industrially advanced nation.

The exact size and composition of the industrial education division would vary from nation to nation, depending on the area and population of the nation, the number of vocational industrial schools and colleges to be administered, the level of qualifications of the administrators and teachers in the individual schools, and other factors. The Philippines in FY '56 was operating a system of 35 urban and provincial vocational industrial schools somewhat similar to the type proposed in this discussion. The central staff engaged in the administration of these 35 schools consisted of 40 people as outlined below:

1 Superintendent, Chief of Division
1 Superintendent-at-Large
2 Superintendents of Industrial Education
9 General Supervisors
7 Specialized Supervisors, as listed below

  1 Supervisor of Woodworking Courses
  1 Supervisor of Mechanics Courses
  2 Supervisors of Electricity Courses
  1 Supervisor of Printing Courses
  1 Supervisor of Ceramics Courses
  1 Supervisor of Vocational Industrial School Libraries

1 Supervisor of Industrial Teacher Education
2 Supervisors of Girls Trade Courses
1 Architect
1 Mechanical Engineer
1 Civil Engineer
4 Draftsmen
10 Clerks

While the Philippines ratio of central administrative personnel to number of schools may not be fully applicable to other nations, at least the Philippines experience will serve to indicate in a general way the extent and nature of the central administrative staff likely to be needed in a period of expansion and improvement of the vocational industrial schools of a newly developing nation.

In many newly developing nations, where the faculties of the individual vocational industrial schools are lacking in many essential administrative and technical skills, it will be of utmost importance to have a fairly large central administrative staff, manned with as highly qualified personnel as can be obtained. In the preliminary planning for an assistance project in vocational industrial education, therefore, provisions should be made for the development of a well-manned central administrative staff of ample size in relation to the number of schools and colleges to be administered.

5. Teacher Education

Attached to one or two of the best urban vocational industrial colleges in the nation would be a teacher education department. The program of vocational teacher education would take its general direction from the overall national program of economic development. The teacher education department would offer a four-year college level program for students who had graduated from a provincial or state vocational industrial school or from the secondary school department of an urban vocational industrial school. Upon graduation from the teacher education department, the student would receive a bachelor's degree or its equivalent.

The first two years of study in the teacher education department could be identical with the two years of study in the junior college level program of the urban vocational industrial school. The student would select an area of specialization, for example machine shop, and would receive both shop training and related classroom instruction in science, mathematics, language, and social studies. In the final two years of study the student would continue to take shopwork and related classroom subjects and in addition would receive instruction in a well-rounded set of professional education subjects. The professional education subjects would include educational sociology, educational psychology, methods of teaching industrial subjects, trade and job analysis, course construction, educational measurement and evaluation, shop planning and management, audio-visual education, principles of vocational education, guidance, and practice teaching.

The graduates of the teacher education department would be used to staff the vocational industrial schools and colleges throughout the nation. The central administrative staff in vocational industrial education would determine the number of new teachers needed each year to replace retiring teachers and to fill new positions created by the expansion of existing schools and the opening of new schools. A guidance program would regulate the number of students admitted to the teacher education department in order to maintain a reasonable balance between the supply and demand for vocational industrial teachers.

The faculty of the teacher education department would be carefully selected and would be composed of the best vocational industrial teachers in the nation. Until university work was available locally, as many as possible of the faculty members would be sent abroad for one year or more of study in industrially advanced nations in order to develop a high degree of competence in their respective fields of specialization.

In addition to pre-service teacher education during the regular school year, the teacher education department would operate summer school classes for employed teachers. These summer school classes would include shop courses, academic subjects, and professional education subjects and would provide a means for the in-service training and continuous upgrading of the vocational industrial teachers throughout the nation.

It should be noted that the type of teacher education department proposed here differs considerably from the teacher education systems used in the more highly industrialized nations. The accepted practice in industrialized nations is to recruit vocational industrial teachers from among the craftsmen in industry. These craftsmen, already possessed of a high degree of skill in their respective occupations are then provided with professional education courses to prepare them for teaching.

In newly developing nations, however, where the level of industrial skills and general education is low and trained workers are scarce, it is difficult if not impossible to secure suitable candidates for teaching positions from among the workers in industry. It is necessary, therefore, to establish a program for the in-school training of vocational industrial teachers.

In nations where this is done, though, the vocational administrators should be cognizant of the fact that in the long run teachers recruited from among the skilled craftsmen in industry will be superior to teachers who are entirely school trained. As the nation develops economically and the nation's industrial plant facilities are expanded and improved, plans should be made for gradually supplementing the in-school training of vocational industrial teachers with a system for securing craftsmen from industry and giving them added teacher education. When this is done, it will be necessary for the teacher education department to revise its program by reducing the shop courses and concentrating on the offering of professional education subjects to craftsmen who are already well versed in the skills of their occupations.

In the meantime, while in-school training of vocational industrial teachers is being practiced, arrangements should be made for both the employed teachers and the student teachers to receive as much industrial experience as possible. For example, the teacher education department might arrange for student teachers to work in selected industrial plants during the summer vacations. Also, the central administrative staff might arrange for employed teachers to have a year's leave of absence during which they would work in some of the more advanced industrial establishments in the nation.

In most newly developing nations today, the educational authorities are interested not only in developing programs of vocational education but also in expanding and improving the system of general secondary education. In the course of modernizing and strengthening the general secondary education program, many of the nations are finding, as did the Philippines, that it is desirable to include industrial arts courses in elementary schools and in the general secondary schools.

If, in the hypothetical host nation under consideration, such courses were to be added to the middle grades and to the general secondary curriculum, the teacher education department of the urban vocational industrial college would be assigned the responsibility for preparing industrial arts teachers for service in these lower schools. With its well-equipped shops, its skilled faculty members, and its technical atmosphere, the urban vocational industrial college would be in a better position to prepare industrial arts teachers than would an academic teacher education institution. Further, by using the facilities of the urban vocational industrial school for the preparation of industrial arts teachers, the host nation would avoid the necessity for equipping and operating expensive duplicate shop facilities at an academic teacher education institution.

Students preparing to be industrial arts teachers would not follow the same course of studies as students preparing to be vocational industrial teachers but would be enrolled in a separate curriculum. While the professional education subjects in the two curricula would be similar in many respects, the shop courses would differ considerably. Students in the industrial arts teacher education curriculum would not specialize heavily in one shop but would receive broader and less intensive training in a variety of types of shopwork. Upon graduation they would be qualified to teach the diversified types of courses appropriate for an industrial arts program in a newly developing nation. If, in the rural regions of the host nation, the elementary schools and the general secondary schools were participating in community school work, the students in industrial arts teacher education would receive special training that would fit them for providing leadership in the practical and technical aspects of community development programs.

By undertaking, in addition to its other functions, the responsibility for preparing industrial arts teachers, the teacher education department in the urban vocational industrial college would assist in the development of a more practical and more effective type of elementary school and of general secondary education and would contribute to a wider diffusion of industrial knowledge throughout the general population.

6. Preparation of Administrators and Supervisors

In order to provide for the development of leaders in vocational industrial education, a permanent, institutionalized program for the preparation of vocational industrial administrators and supervisors would be established in the host nation's major public university. This program would operate at the graduate level and would lead to the master's and doctor's degrees in vocational industrial education.

In carrying out such a program, it would not be necessary for the university to set up expensive shop facilities, equipped with industrial tools and machines. Prerequisites for any candidate entering the graduate program in vocational industrial education would be that: (1) he had completed the bachelor's degree in vocational industrial education at the teacher education department of one of the urban vocational industrial schools or colleges, and (2) he had performed three or more years of outstanding teaching in a vocational industrial school. It would be assumed that such a candidate already had a mastery of the necessary technical skills and the teaching methodology of vocational industrial education. The graduate program at the university would be concerned with developing in the candidate broad foundations in educational sociology, educational psychology, and economics, as well as providing him with advanced training in specialized aspects of vocational education such as occupational surveys, occupational analysis, selection and organization of vocational subject matter, organization and administration of vocational education, vocational school finance, supervision of vocational education, shop planning and equipment selection, history of vocational education, philosophy of vocational education, adult vocational education, and comparative vocational education.

Such a program would not require extensive physical facilities, other than regular classrooms, but it would require a few highly competent faculty members, experienced in vocational industrial education, capable of teaching the theoretical concepts of vocational industrial education at an abstract level, and with the ability to supervise and guide research and long-range thinking about the policies and practices of vocational industrial education. To start the program, it would be necessary to send two or more of the host nation's most capable and experienced vocational industrial educators abroad to take advanced courses and obtain the doctor's degree in vocational industrial education. These men would then return to the host nation's major university and form the nucleus of the staff for graduate research and training in vocational industrial education.

In addition to the sending of two or more of the host nation's vocational industrial educators abroad to be trained as a nucleus for the graduate faculty in vocational industrial education, it would be desirable to secure for two or three years the services of a foreign vocational educator, experienced in research and in the teaching of graduate level vocational industrial education courses, to assist in organizing and launching the graduate program in vocational industrial education at the national university.

A small staff of three or four professors of vocational industrial education could handle a sizable number of graduate students, because the program of graduate studies in vocational industrial education would draw heavily on the varied resources of the university, such as existing courses in educational sociology, educational psychology, educational administration, guidance, economics, etc. The professors of vocational industrial education would have to teach only the advanced courses dealing specifically with vocational education subject matter.

It should be stressed that for the program to be successful it would be essential that: (1) the professors of vocational industrial education be men who had had broad and successful experience in the actual operation of vocational industrial schools, followed by graduate study and the obtaining of the doctor's degree in vocational education, and (2) the graduate students admitted to the program be mature persons who had obtained the bachelor's degree in vocational industrial education and had demonstrated their ability as successful teachers in vocational industrial schools.

The development of the graduate level program in vocational industrial education at the host nation's national university rather than at one of the urban vocational industrial colleges would offer a twofold advantage: (1) the graduate students in vocational industrial education, in addition to receiving specialized training, would be able to participate in the university's broad foundation courses in education along with the graduate students in general education and thus would develop the broad understanding of the education program as a whole which is decidedly preferable to the narrow outlook which might result from their studying at a more specialized institution, and (2) the vocational industrial education professors at the university could, in addition to teaching specialized courses for vocational education majors, offer a few orientation courses in vocational education for graduate students in general education, thus improving the general education students' understanding of the nature and purpose of vocational education. This intermingling of faculty, students, and courses would tend to bring about mutual understanding and teamwork among the rising generation of leaders in vocational education and in general education.

From the students who completed the master's and doctor's degrees in vocational industrial education at the national university would emerge the well-educated and farsighted leadership needed constantly to examine, revise, and improve the structure and functioning of the national vocational industrial education system. As the nation developed economically and progressed through the various stages of industrialization, these leaders would constitute the built-in self-correcting mechanism that would keep the vocational industrial education system always up to date and responsive to the changing needs of the nation.

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TABLE XXXV EQUIPMENT FURNISHED BY ICA	Bulacan TS	Pampanga SAT	Tarlac TS	Mindanao SAT	Sulu TS	Zamboanga City SAT	Cebu SAT	Central Luzon SAT	Davao City TS	Northern Luzon SAT	La Union SAT	Rodriguez VHS	Camarines Sur SAT	East Visayan SAT	Bicol SAT	P. Forbon TS	Cagayan Valley SAT	Pangasinan SAT	Capiz TS	Samar TS	Western Luzon SAT	Bataan SAT	Philippine SAT	Ilocos Norte TS	Marinduque SAT	Iloilo SAT	Abellana VHS	Aparri VHS	Bohol TS	Isabela TS	Leyte SAT	Sorsogon SAT	Negros Occidental SAT		Total
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	
I. Woodworking Machines																																			
Jointer, 8 inch	1			1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1		1	1	1	1	1	1	31
Jointer, 12 inch			1					1						1				1																	4
Planer, 18 inch	1		1	1	1	1	1	1	1	1	1					1		1		1	1	1		1	1		1	1	1	1		1	1		23
Planer, 24 inch			1			1	1					1		1												1								1	7
Circular Saw, 10 inch			1	1		1			1	1	1	1	1	1	1	1	1		1	1	1	1		1	1	1	1	1	1	1	1	1	1		26
Circular Saw, 12 inch	1				1	1		1										1																1	6
De Walt Saw, 5 HP				1		1			1										1		1	1			1					1			1	1	10
Jig Saw, 24 inch		1		1	1	1	1	2	1	1	1	1	1	1	1	1			1		1	1		1	1		2	1	1		1	1	1	1	28
Band Saw, 14 inch		1		1			1		1																										4
Band Saw, 20 inch																1			1		1	1		1	1		1	1	1	1		2	1		13
Band Saw, 30 inch			1	1	1	1			1	1	1			1	1		1			1														1	12
Lathe, Woodturning, 12 inch	2	2	2	2	2	2	2	2	2	3	3	3	3	3	2	2	2	2	2	2	2	2		2	2	2	3	3	3	3	3	3	3	3	79
Lathe, Woodturning & Metalspinning, 12inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	35
Mortiser, ½-inch capacity	1		1	1	1	1			1	1	1	1	1	1	1	1	1		1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	29
Router, portable, 1 HP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Sander, portable, 1 HP	1		1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	38
Disc Sander, 18 inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Dowel and Rod Turning Machine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Leveling Transit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Threading & Tapping Machine for Wooden Vises						1		1					1				1									1									5
Exhaust Fan and Motor	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1				1	1	1		1	1							1	23
Shaper, Woodworking																										1									1
Cement Mixer, electric																										1									1
II. Metalworking Machines																																			
Arc Welder, AC, 180 amp.	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	2		1	1	2	1	1	1	1	1	1	1	1	36
Arc Welder, DC, 180 amp.																						3													3
Gas Welding & Cutting Outfit									1													1												1	3
Forge, hand powered	2	2	2	2	2	2	2	2	2	4	4	4	4	4	2	2	2	2	2	2	2	2		2	2		2	2	2	2	2	2	2		72
Forge Blower, electric, with 4 tuyere irons	1	1	1	1	1	1	1	1	1		1			1		1								1		1									14
Anvil, 150 pound	6	6	6	6	4	6	6	6	6	4	6	4	4	6	2	4	2	2	2	2	2	2		6	2	4	4	4	4	4	4	4	4		134
Lathe, metalworking, 10 inch	2	1	1	2	1	2	1	1	1	1	1	1	2	2	2	1	2	2	1	1	1	1		1	1		3	2	2	1	2	2	2	2	48
Lathe, metalworking, 13 inch			1		1	1	4	4	1	1	2		2	2			1	1				4	5			7								1	38
Shaper, 7 inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1										24
Shaper, 20 inch			1			1	1	1			1		1	1			1	1				1	1			1	1	1	1	1		1	1	1	19
Milling Machine, Size "0", Sheldon	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1		1	1	1	1	1	1	1		31
Milling Machine, universal, 9½"x37" table							1	1			1							1				1				1								1	7

EQUIPMENT FURNISHED BY ICA (continued)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	To-tal
Hack Saw, power, floor model	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Drill Press, bench model, 15 inch		1		1			1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1		33
Drill Press, floor model, 15 inch																											2	2	2	2	2	2	2		14
Drill Press, floor model, 20 inch		1								1								2	1					1		1								1	8
Drill Press, power feed type, 21 inch			1	1	1	1	1	1			1		1	1			1	1				1				1									13
Arbor Press, 1½ ton	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Electric Drill, portable	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	1	1	1	1		1	1		1	1	1	1	1	1	1	1	37
Bench Grinder, 7 inch	2	2	2	2	2	2	2	2	2	3	3	3	3	3	2	2	2	2	2	2	2	2		2	2	2	3	3	3	3	3	3	3	2	78
Pedestal Grinder, 10 inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1	2	1	1	1	1	1	1	1	1	36
Tool Post Grinder								1																		1									2
Squaring Shear, 36 inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Combination Brake & Folder, 42 inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Bar Folder, 30 inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Box and Pan Brake, 24 inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Slip Roll Forming Machine, 36 inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Lever Punch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Rapid Grooving Machine, 36 inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Ring and Circle Shear, 42½ inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Beading Machine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Double Seaming Machine, 15½ inch	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Combination Crimper and Beader	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Turning Machine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Burring Machine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Wiring Machine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Setting Down Machine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Berkroy Set of 5 Small Machines	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1		32
Nibbler, 12 inch, ½ HP	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Unishear, electric	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1									25
Set of Sheet Metal Stakes (15 pcs+plate)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
III. Equipment for Electricity Shops																																			
Voltmeters, DC	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		4	4	4	4	4	4	4	4	4	4	4	132
Voltmeters, AC	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4		4	4	3	3	3	3	3	3	3	3	3	123
Ammeters, DC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	66
Ammeters, AC	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	66
Volt-Ohm-Milliammeter	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Galvanometer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1										24
Insulation Resistance Tester, Vibrotest Model 206							1				1							1				1	1			1									6
Oscilloscope, Model WO-56A							1				1							1				1	1			1									6
Transformer, 220 to 110 volts, 500 watts	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	66
Transformer, 220 to 8-24 volts (variable)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	66
Transformer, 220 to 6 volts, 5 watts	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2	2	2	2	2	2	2	2	2	2	2	66
Diesel-Electric Generator Unit 55 KW		1		1		1	1	1		1	1				1	1	1	1		1	1	1			1	1	1					1	1		19
Diesel-Electric Generator Unit, 18 KW	1		1		2				1				2						2					1				1	1	1	1				14

EQUIPMENT FURNISHED BY ICA (continued)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	To-tal
Hook-on Wattmeter		1	1			1	1	1			1		1					1				1	1			1								1	12
Hook-on Volt-Ammeter		1	1			1	1	1			1		1					1				1	1			1								1	12
Basic Electricity Demonstration Kit, Crow Model 100-G							1	1			1							1				1	1			1								1	8
Beginner's Experimental Kit in Electricity, Crow 41-B							10				10							10				10	10			10									60
Instructor's Kit for Advanced Electricity, Crow 110							1				1							1				1	1			1									6
Instructor's Kit in General Electricity, Crow 500-G							1				1							1				1	1			1									6
Choke and Resonance Coil Kit, Crow 600							1				1							1				1	1			1									6
Rotating Electric Machine Kit, Crow 700							3				3							3				3	3			3									18
Selenium Rectifier Assembly Kit							1				1							1				1	1			1									6
IV. Equipment for Mechanics Shops																																			
Brake Drum Lathe	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Carbide Cutter Grinder	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Brake Re-Liner and Riveting Machine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Engine Analyzer	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Valve Seat Grinder	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	32
Valve Re-Facer	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	32
Wheel Aligner	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Toe-in Gage										1	1	1	1	1	1	1	1	1	1	1	1	1		1	1		1	1	1	1	1	1	1	1	23
Battery Charger	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1		1	1	1	1	1	1	1	1	32
Air Compressor, 5 HP, electric	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Paint Spray Gun	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Hoist, Differential, 2-ton capacity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1		1	1	1	32
Jack, Hydraulic, 5-ton capacity, on wheels	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Porto Power Set, 20-ton	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Hydraulic Press, 50 to 70 ton	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Growler	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Hydrometer	4	6	6	4	4	6	6	6	4	2	6	6	6	6	4	2	4	6	2	4	2	2		6	2	2	4	4	4	4	4	4	4	4	140
Vacuum Fuel Pump Tester	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	2	2	1	2	1	1		2	1	1	1	1	1	1	1	1	1	1	42
Clutch Aligner	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	1	2	2	1	2	1	1	1	2	1	2	2	2	2	2	2	2	2	2	61
Rod Aligner	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Tydeman Hone	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Cylinder Hone, 2$\frac{11}{16}$" to 4$\frac{1}{4}$" capacity	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Cylinder Hone, 2" to 2.6" capacity				1	1	1																							1						4
Cylinder Ridge Remover, 2$\frac{2}{8}$" to 4$\frac{1}{8}$" range	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	1	2	2	1	2	1	1		2	1	1	1	1	1	1	1	1	1	1	51
Steering Gear Puller	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Universal Wheel Puller	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Master King-Pin Puller	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Greasing Set, hand powered	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Wheel Bearing Service Unit	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34
Disc Sander & Polisher, electric, portable	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	33
Spark Plug Cleaning & Testing Machine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	34

EQUIPMENT FURNISHED BY ICA (continued)	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	BB	CC	DD	EE	FF	GG	HH	To-tal
Cylinder Boring Bar, range 2.6" to 5.3"	1		1	1		1		1			1		1	1			1	1				1					1								12
Vacuum Chip Remover for Boring Bar	1		1	1		1		1			1		1	1			1	1				1					1								12
Diesel Nozzle Test Stand				1		1	1	1			1				1		1	1					1			1								1	11
Universal Diesel Fuel Injection Pump Calibrating Test Stand				1		1	1	1			1				1		1	1					1			1								1	11
Ice-Making Machine																										1									1
V. Audio-Visual Equipment																																			
Movie Projector, Sound, 16 mm	1	1	1	1	1	1			1	1	1		1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1		29
Filmstrip and Slide Projector, 35 mm	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		32
Opaque Projector	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1		32
VI. Ceramics Equipment																																			
Kiln, electric, 15x18x21 inches inside							1	1		1				1			1	1					1			1	1								9
Kiln, oil-fired, 20x20x20 inches inside											1				1										1										3
Potter's Wheel, foot-operated							1	1		1				1			1	1					1			2									9
VII. Printing Equipment																																			
Silk Screen Printing Outfit					1		1	1				1	1										1			1	1								8
Letterpress Printing Outfit					1		1	1				1	1										1			1	1								8
Offset Platemaking & Printing Outfit																							1												1
Vari-Typer																							1												1
VIII. Foundry Equipment																																			
Cupola Furnace, capacity ½-ton per hour							1				1											1	1			1									5
Bull Ladle, 100-pound capacity							1				1											1	1			1									5